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REVIEW OF APPLIED MYCOLOGY

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TJALLINGII (F.). **Onderzoekingen over de mozaïekziekte van de Augurk (Cucumis sativus L.).** [Studies on the mosaic disease of Gherkin (*Cucumis sativus* L.).]—*Meded. Inst. plziektk. Onderz.* 47, 117 pp., 12 figs., 2 graphs, [? 1953. English summary].

Most of the essential information in this expanded, tabulated version of the author's studies on cucumber mosaic virus of gherkins in Holland has been presented from other sources [*R.A.M.*, 29, p. 491; 32, p. 231], but mention may be made of *Matthiola incana* (doubtfully infected), *Mercurialis annua*, and *Scrophularia nodosa*, which are thought to be newly recorded hosts. The trouble was already known in the country in 1900, though not recognized as a virus disease, and caused such heavy damage in the Venlo region as to necessitate a special investigation (*Versl. RijkstuinbProefveld. Z.-Holl.*, 1908–14).

MEHROTRA (B. S.). **The cottony leak of Citrullus fistulosus fruits.**—*Lloydia*, 16, 3, pp. 157–161, 2 figs., 1953.

Fruits of *Citrullus vulgaris* var. *fistulosus* obtained from Allahabad market in May, 1952, and subsequently during the rainy season of the same year, were found to be infected by *Pythium aphanidermatum* [cf. *R.A.M.*, 32, pp. 466, 535], the external and internal symptoms of the disease resembling those described for the same fungus on cucumber [5, p. 71]. Pathogenicity was proved by inoculation. Fruits, both incised and scraped, became almost completely covered by mycelial growth in 48 hours; infection of undamaged fruits was slower but equally extensive. Healthy fruits placed in contact with inoculated ones became infected. The only control method available at present consists in careful handling of the fruits during transit and discarding diseased ones in storage.

[A condensed account of this work appeared in *Sci. & Cult.*, 19, 11, pp. 564–565, 2 figs., 1954.]

FREITAG (J. H.) & FRAZIER (N. W.). **Natural infectivity of leaf-hopper vectors of Pierce's disease virus of Grape in California.**—*Phytopathology*, 44, 1, pp. 7–11, 1954.

At the Division of Entomology and Parasitology, University of California, Berkeley, tests were carried out to determine the percentage of viruliferous leafhopper vectors of Pierce's disease [lucerne dwarf] virus of vine [*R.A.M.*, 33, p. 464] in a number of different natural habitats, with special attention to the economically important green, red-headed, and blue-green sharpshooters (*Draeculacephala minerva*, *Carneocephala fulgida*, and *Hordnia circellata*, respectively) [31, p. 168].

The two former species were found to be most highly infective when collected in lucerne fields, but individuals taken from vineyards, irrigated pastures, roadsides,

ditches, and various natural breeding areas were also viruliferous. The nymphal stages of *D. minerva* comprised a smaller infective population than the adults. Both species were naturally infective in every month of the year except February, when only a few tests were conducted, a high point being reached in March with a decline in April and during the summer, followed by a fresh increase in the autumn, culminating in October. *H. circellata* also attained its highest degree of infectivity during the autumn in vineyards, natural breeding areas, and ornamental gardens. *Helochara delta*, collected at an altitude of 7,000 ft. in the Sierra Nevada mountains, remote from cultivated vines and lucerne, proved to be a natural carrier of the virus.

The results of the studies indicate that the natural occurrence of lucerne dwarf virus is co-extensive with the presence of the three principal vectors. Of the 15 species of leafhopper vectors tested for natural infectivity, 11 were found to be viruliferous; they frequent widely different habitats, including the seashore, mountains, the desert, and cultivated valleys, and were, in fact, absent from only three localities in a limited number of experiments.

Picco (D.). **Esperienze circa l'impiego di preparati acuprici nella lotta contro la Peronospora della Vite.** [Experiments on the use of non-copper preparations in the control of Vine *Peronospora*.]—*Notiz. Malatt. Piante*, 24–25 (N.S. 3–4, *1954*), pp. 65–73, 1 graph, 1954.

In this paper, read at the second convention of the Società italiana di Fitoatria, held at Parma in September, 1953, the author states that during 1953, spraying tests against vine mildew [*Plasmopara viticola*: cf. *R.A.M.*, 32, p. 362 and next abstract] were carried out by the Cryptogamic Laboratory and Observatory for Plant Diseases, Pavia, in a vineyard at Godiasco, in the Pavia area of the Po Valley. The vines were sprayed on 13th and 30th May, 15th and 30th June, and 11th and 31st July. Five routine applications of ventilated sulphur were made against *Oidium* [*Uncinula necator*]. The ratings (number of infected leaves per 100 vines; infection index, taking Bordeaux mixture as 100; and the index of effectiveness compared with Bordeaux) were for 1–1–100 Bordeaux mixture 1,586, 100, and 1; for 0·3 per cent. captan [33, p. 10] (50 per cent. active ingredient) 400, 25, and 4; for the following materials with an ethylbisdithiocarbamic acid base plus a very small amount of copper: 0·3 per cent. cuprotan (80 per cent. dithane Z-78, 5 per cent. hydrated copper oxychloride at 40 to 45 per cent., and 15 per cent. wetters and adhesives) 969, 61, and 1·6; 0·3 per cent. antiperonosporico AC (80 per cent. zineb and a copper salt with 2 per cent. metallic copper) 987, 62, and 1·6; 1 per cent. ditiamina (13 per cent. zineb, 2 per cent. copper, and about 85 per cent. activating, dispersive, suspended, and adhesive materials) 843, 53, and 1·9; and 0·5 per cent. cuproexina (about 80 per cent. zineb with copper oxychloride) 1,254, 79, and 1·3; the same materials without the copper: 0·3 per cent. ditano (65 per cent. dithane Z-78 plus wetter) 843, 53, and 1·9; 0·3 per cent. dithex (65 per cent. dithane Z-78) 943, 59, and 1·7; 0·3 per cent. antiperonosporico A (about 80 per cent. zineb) 1,577, 99, and 1; 1 per cent. fuclasin (20 per cent. active substances) 1,221, 77, and 1·3; 0·5 per cent. exina (an unspecified wettable powder) 1,026, 64, and 1·6; and 0·8 per cent. D.D.-1 (a wettable powder with a zineb base) 1,681, 106, and 0·9; and also 1 per cent. cuneese (50 per cent. aluminium sulphate and 50 per cent. kaolin, coloured with methylene blue) 8,045, 507, and 0·2.

If averages are taken for the materials grouped according to their active constituent, then the figures (still in comparison with Bordeaux mixture) are: 400 infected leaves per 100 vines for captan, 1,011 for the dithane products plus a trace of copper, and 1,153 for the same without copper. Of the sprays tested, only Bordeaux mixture gave any control of *U. necator*.

Graniti (A.). **Prove di lotta contro la Peronospora della Vite in Sardegna nell'anno 1952.** [Experiments on the control of *Peronospora* of the Vine in Sardinia in the year 1952.]—*Notiz. Malatt. Piante*, 24–25 (N.S. 3–4, *1954*), pp. 75–82, 1954.

In this paper, read at the second convention of the Società italiana di Fitoatria, held at Parma in September, 1953, the author describes a spraying test against vine mildew (*Plasmopara viticola*) [see preceding abstract] carried out at Mamuntanas, Alghero, Sardinia, in 1952. The locality is one where severe outbreaks often occur in autumn, fungicidal treatment usually ceasing in late spring or early summer when the rainy season closes. The main purpose of the test was to determine the persistence of the different materials on the plant.

Conditions favouring infection occurred from 21st to 26th April. The applications were made on 28th April, 3rd May, and 29th May. The materials used were 1 per cent. Bordeaux mixture; the same at 0·7 per cent. plus 0·15 per cent. solplant wetter; 1 per cent. anticrittogamico M (activated copper sulphate) plus 0·1 per cent. solplant wetter; 1 per cent. Caffaro powder; 1 per cent. S. L.66 (zineb); 0·3 per cent. copper-Sandoz; 1 per cent. cupramina (copper sulphate+copper ammonium sulphate+sodium sulphate) [*R.A.M.*, 22, p. 287; 28, pp. 376, 617] plus solplant; 1 per cent. ST67 (zineb+traces of copper); 0·25 per cent. captan [see preceding abstract], and 1 per cent. Rumianca copper oxychloride.

These treatments had no effect on the weight of berries produced. Attacks of the disease during the four months following the final treatment completely defoliated untreated vines; those treated with the non-cupric products lost 90 to 98 per cent. of their leaves, those given oxychloride, activated copper sulphate, or cupro-ammoniacal base 61 to 68 per cent., 0·7 per cent. Bordeaux and copper Sandoz 50 to 55 per cent., and 1 per cent. Bordeaux 34 to 39 per cent. The extent of the lignification of the branches appeared to be inversely proportional to the amount of defoliation caused by infection. It is concluded that from every point of view Bordeaux mixture was distinctly superior to the other products tested.

Peyer (E.) & Huber (H.). **Prüfung neuer Spritzverfahren im Rebbau.** [Assay of new spraying procedures in viticulture.]—*Schweiz. Z. Obst- u. Weinb.*, 63, 8, pp. 163–171, 7 figs., 1 plan, 1954.

During 1953 two central, fixed, high pressure spraying installations, the 'Chilcheweg-Buck' and the 'Myers' type 4635, were tested against vine *Peronospora* [*Plasmopara viticola*] in the Zürich district of Switzerland [see following abstracts] with very satisfactory results. On the other hand, the use of the mist blower 'Contra-Nebelgerät Schäfer' cannot be recommended, on the grounds either of efficiency or economy, pending further investigations.

Zobrist (L.). **Rebspritzung mit dem Helikopter, Aussichten für die praktische Anwendung.** [Vine-spraying with the helicopter, prospects for practical application.]—*Schweiz. Z. Obst- u. Weinb.*, 63, 8, pp. 171–175, 3 figs., 1954.

From the experience gained to date in the use of the helicopter for spraying vines against downy mildew [*Plasmopara viticola*] in Switzerland [*R.A.M.*, 33, p. 404 and preceding and next abstracts], the author concludes that four conditions must be realized to ensure the success of the method in practice, namely, (1) the vineyard must be situated on flat or gently sloping ground without steep declivities; (2) the vines must cover a compact area exceeding 50 ha.; (3) there must be a central landing-ground; and (4) an experienced pilot must be available.

Kundert (J.). **Die Peronospora der Rebe und ihre Bekämpfung in Jahre 1953.** [*Peronospora* of the Vine and its control in the year 1953.]—*Schweiz. Z. Obst- u. Weinb.*, 63, 3, pp. 47–53, 1 graph, 1954.

For many years preparations for vine downy mildew (*Peronospora*) [*Plasmopara*

viticola] control in the Zürich district of Switzerland [see preceding abstracts] have been tested at the Wädenswil Experiment Station on plots of the highly susceptible Riesling × Sylvaner variety, leaving 18 grafts on two different stocks untreated as controls. In 1953 the first leaf symptoms on sprayed vines just outside the experimental area were observed on 20th June, and on the 23rd five mildewed leaves were detected on untreated scions on the stock 1616, those on 101/14 remaining free from attack until 4th July, when two leaves were mildewed; by this time the incidence on the 1616 scions had already reached 11 per cent. Fruit infections appeared on 1616 on 30th June and on 101/14 on 8th July and spread uninterruptedly, favoured by the abnormally heavy rainfall (600 mm. on 38 days in June and July), until on 5th August there were no sound leaves or fruits left.

Of the six fungicides tested, Bordeaux mixture (1 and 1·5 per cent. for pre- and post-blossom sprays, respectively) and copper thiocarbamate (0·5 and 0·6 per cent.) were the most effective, with efficiency ratings of 99·4 per cent., corresponding to 0·5 per cent. fruit infection. Next in order (98·8 per cent.) came copper-sulphur-captan preparation, used at a strength of 0·5 per cent. for all treatments, and 0·25 per cent. captan preparation (flit 406), with a rating of 97·9, the fruit rot percentages being 1 and 1·8, respectively. Inferior to the foregoing, but still adequate, were 0·5 per cent. copper-captan preparation, permitting 4·9 per cent. fruit infection and rated at 94·3 per cent., and copper oxychloride dust (0·5 for pre- and 0·75 per cent. for post-blossom) with 93·4 and 5·7 per cent., respectively.

Flit 406 was applied nine times (at 0·2 per cent. for the first, 0·25 per cent. for the next seven, and 0·5 per cent. for the final treatment of the fruits) to three varieties, of which Madelaine Céline proved to be the most susceptible with 36·5 per cent. infection, white Gutedel the least so (4·8), and red Gutedel intermediate (10·9).

Although the normal weather conditions prevailing in August and the ensuing fine, warm, and dry autumn were conducive to the development of mildew (*Oidium*) [*Uncinula necator*], heavy infection was observed only on vines treated with organic preparations [cf. *R.A.M.*, 33, p. 277 and above, p. 578], which appear definitely to further attacks by the fungus on both foliage and fruit. On the other hand, the organic fungicides caused no perceptible damage to the foliage, which remained in reasonably good condition until the late autumn, whereas all the copper-containing sprays caused scorching, copper oxychloride being more injurious in this respect than Bordeaux mixture.

Appel (O.) & Richter (H.), Ed. **Sorauer (P.). Handbuch der Pflanzenkrankheiten. Band II. Lieferung. 1. Viruskrankheiten. Sechste Auflage.** [Handbook of plant diseases. Volume II. Part 1. Virus diseases. Sixth edition.]—xvi+770 pp., 308 figs., 7 diags., 11 graphs, Berlin, Paul Parey, 1954. DM. 150.

The striking progress made in the knowledge of plant viruses since the last issue of this volume [*R.A.M.*, 13, p. 646] of this treatise [32, p. 579] necessitated an appreciable extension of the hitherto comparatively modest space allotted to the subject. In the present instalment M. Klinkowski is responsible for the first (general) part (pp. 1–132), comprising an introduction and sections (each with a bibliography) on infection and virus multiplication and spread in the host; pathological symptoms; morphology and physico-chemistry of the viruses; virus inactivation and inhibition of infection; disease transmission; differentiation and classification of virus types; differentiation within the type, variability, and mutability; mixed infection and virus interactions; resistance and specialization; and control.

In the special part (pp. 133–706) compiled by E. Köhler the viruses are treated individually under the various crops (including numerous ornamentals) and under the common name of each disease, with synonyms, symptoms, transmission, control, resistant varieties, and a bibliography for each. In view of the continued absence

of an internationally recognized system of nomenclature, a special effort has been made to include as many synonyms as possible. The book, which is intended to serve the interests of botanists, biologists, biochemists, plant pathologists, and the chemical industry, concludes with a subject index (pp. 709–770).

STAPP (C.). **Die Serologie in ihrer Bedeutung für die Erforschung pflanzlicher Virosen und deren Bekämpfung.** [The importance of serology in research on plant viroses and their control.]—Reprinted from *Landw. Forsch., Suppl.* 4, pp. 170–180, [? 1953].

Most of the 60 titles forming the basis of the author's survey of the application of serological methods to the study and control of virus diseases of plants have been noticed from time to time in this *Review*.

FONSECA (H.). **Pequena resenha histórica e alguns dados sôbre virus.** [A brief historical survey and some facts concerning viruses.]—*Rev. Agric., Piracicaba*, 29, 3–4, pp. 122–125, 1954.

The history of virus research, from the first reference to breaking in tulips by Clusius in 1576 to the present day, is concisely summarized from the treatises of K. M. Smith (second edition) [*R.A.M.*, 27, p. 461], Butler and Jones [29, p. 319], and Bawden (third edition) [30, p. 13].

JOHNSON (C. G.). **Aphid migration in relation to weather.**—*Biol. Rev.*, 29, 1, pp. 87–118, 5 graphs, 1954.

Some of the 59 references in the bibliography on which this survey is based are concerned with the function of aphids in the transmission of plant viruses.

NEWTON (W.) & PEIRIS (J. W. L.). **Virus diseases of plants in Ceylon.**—*F.A.O. Pl. Prot. Bull.*, 2, 2, pp. 17–21, 1 fig., 1953.

Cacao in Ceylon is affected by a virus disease resembling an attenuated form of swollen shoot [cf. *R.A.M.*, 27, p. 178]. No swellings are present, but affected trees have the characteristic foliage symptoms of vein-clearing and vein-banding. The disease has been transmitted to seedlings by grafting and by species of mealybugs tentatively identified as *Pseudococcus lilacinus* and *P. citri*. All plantations carrying trees 20 years old or more appear to be affected; those under ten years old are mostly free.

Dadah (*Erythrina lithosperma*), commonly used as a shade tree over cacao, invariably becomes affected by vein-banding when the cacao beneath is severely attacked by the cacao vein-banding virus.

Pigeon pea is affected locally by two virus diseases. Yellow mosaic, characterized by a bright yellow, blotchy foliage mottle, does not seriously reduce yields, incidence seldom exceeding 10 per cent. at seed maturity; it appears to be confined to the dry-farming regions of the north central dry belt. Pale mosaic, characterized by vein-banding followed by a pale green mottle, has been found only in the wet zone, near Peradeniya. Unlike yellow mosaic, it spreads rapidly. Sap-inoculated to *Psophocarpus tetragonolobus*, yellow mosaic virus produced conspicuous vein-banding on the new foliage in 10 to 15 days, followed by a yellowish mottle, whereas pale mosaic virus had no effect in 20 days.

A sap-transmissible mosaic virus affects *Crotalaria striata* and *C. hirsuta* in the wet zone, causing vein-clearing followed by a conspicuous pale green mottle. Inoculated to the cowpea variety V4 it induces a mosaic mottle, whereas neither of the pigeon pea viruses causes symptoms on this host. On *P. tetragonolobus*, the symptoms resemble those of pigeon pea yellow mosaic, except that the mottle is less yellow.

Mosaic diseases of Lima bean (*Phaseolus lunatus*), *P. mungo*, and *P. lathyroides* were closely associated with pigeon pea yellow mosaic in the north central dry belt; Lima bean mosaic was the most virulent and widespread.

Sweet potatoes are everywhere affected by a mosaic mottle [cf. 33, p. 16]. In trial plots at Peradeniya the varieties Golden Yellow and White Maltese were severely infected. The disease was readily transmitted by inarch grafting.

Yellow vein mosaic of *Hibiscus esculentus* [22, p. 161; 32, p. 466] is common and extremely severe in the Matale district, yields having fallen by more than 50 per cent. since its appearance a few years ago.

Chilli leaf curl, apparently caused by a virus complex combined with mite injury [18, p. 432; cf. 27, p. 464], is responsible for great damage throughout Ceylon. In the Jaffna Peninsula, where yields have been reduced by 75 per cent., the crop is being abandoned.

Tobacco leaf curl [C.M.I. map No. 147] and mosaic viruses are widespread and disastrous in areas where the crop has been grown over a long period. Leaf curl is the more important. Losses are particularly high in Harrison's Special tobacco. A coarse leaf type often referred to as the Jaffna variety appears to have some tolerance of both diseases. The possibility of protecting newly established tobacco areas is highly promising; at the Hingeragoda Station, central Ceylon, on 150 acres there was only 0·1 per cent. infection at harvest after three years of tobacco cultivation.

Little leaf of eggplant [cf. *R.A.M.*, 19, pp. 61, 259; 20, p. 150] is widespread in the Jaffna Peninsula and elsewhere, seriously affecting fruit yields.

Top leaf curl of tomatoes, prevalent in the wet south-central mountainous regions, is characterized by chlorosis, growth restriction, downward curling, and twisting of the leaves, first affecting the top of the plants. The virus is transmitted by white fly and by inarching, but not by sap-inoculation. It appears to have an exceptionally long incubation period, symptoms seldom appearing in less than 20 days at 80° F. after inarching. In the Peradeniya region tomato plants at the fruiting stage are seldom free from the disease; those that display symptoms when less than a foot high produce little or no fruit.

Banana bunchy top [29, p. 79] still causes serious losses, the failure of many growers to destroy diseased plants in the last two years having resulted in considerable spread.

There is no record of tea phloem necrosis [31, p. 211] at altitudes below 3,000 ft. [24, p. 207]. The disease tends to spread to adjacent plants only.

Baldacci (E.). **La lotta contro le malattie da virus.** [The control of virus diseases.] —*Notiz. Malatt. Piante*, 24–25 (N.S. 3–4, *1954*), pp. 55–64, 1954.

A succinct account is given of the nature, mode of transmission, symptoms, and control of plant virus diseases, the paper terminating with a brief review of the available information on the control of potato degeneration due to viruses and infectious degeneration of the vine [court noué: *R.A.M.*, 32, pp. 302, 423, 605, *et passim*]. Symptoms of the latter disease include double nodes, double or flattened branches, forked branches, irregular or shortened internodes, buds not arranged alternately and occurring only on one part of the branch, the presence of two to four buds where only one occurs normally, branches sickle-shaped at the end, double leaves, 'crested' formations in the leaf stalks at the point of insertion of the leaf, non-setting of the fruit clusters, and berries of different sizes. If four or five of these symptoms are present a vineyard is suspect; if new planting material shows three or four, it should also be considered suspect; if it shows more than five it should be considered diseased. Vines, whether American or Italian, from which grafts are to be made should be free from symptoms.

TINSLEY (T. W.). **The effects of varying the water supply of plants on their susceptibility to infection with viruses.**—*Ann. appl. Biol.*, 40, 4, pp. 750–760, 1 pl., 1953.

Experiments were carried out at Rothamsted Experimental Station to determine how variations in the quantity of water supplied to plants [*R.A.M.*, 31, p. 169] affect their susceptibility (as indicated by the numbers of local lesions produced) to infection by the sap-transmissible viruses of tobacco mosaic in *Nicotiana glutinosa* and White Burley tobacco, tomato bushy stunt in *N. glutinosa*, and potato virus X, tomato aucuba mosaic, and potato virus Y in tobacco. The experiments were made in glasshouses heated during winter on potted plants at the four-leaf stage. Three levels of water were used: (1) wet, secured by standing the pots in saucers that always contained water; (2) medium, receiving five times as much water (or rather less than the amount supplied in ordinary glasshouse practice) as those in the dry (3), achieved by pouring just enough water on to the soil to prevent wilting. Plants given unlimited water developed at least ten times as many local lesions as did plants given only enough to prevent wilting. Susceptibility was increased throughout the year, but the full response occurred in two weeks in winter and four in summer. Plants given unlimited water for the two weeks immediately preceding inoculation were not more susceptible than those given it during the previous two weeks, though the plants differed in appearance. Varying the water supply after inoculation did not affect the number of lesions.

These differences in susceptibility were decreased by growing the plants under shade [cf. 33, p. 278] or by incorporating a diatomaceous earth in the inoculum.

It is concluded that the increased susceptibility induced by an abundant water supply may be partly due to the fact that plants given more water have larger and more succulent leaves, a thinner cuticle, and a less regular palisade tissue than plants kept dry, and would probably have less resistance to injury when rubbed, thus being more easily penetrated by the virus particles.

SMITH (K. M.). **A note on the observation of viruses in the cells of infected plants.**—*Biochim. biophys. Acta*, 10, 2, pp. 210–214, 4 figs., 1953. [French and German summaries.]

In the course of electron microscope studies pursued under the auspices of the National Institutes of Health, Bethesda, Maryland, the cells of *Datura stramonium* infected by tomato bushy stunt virus [*R.A.M.*, 20, p. 428] and of Chinese cabbage (*Brassica* [*napus* var.] *chinensis*) with turnip yellow mosaic virus [32, p. 227] appeared to contain spherical particles of approximately the same size as the viruses themselves. If the particles do, in fact, represent the actual virus, then there are extremely large quantities, especially in the case of tomato bushy stunt.

FISCHER (H.). **Die Organe der Pflanzenquarantäne, ihre Aufgaben und ihre Bedeutung für die heimische Landwirtschaft.** [The plant quarantine agencies, their functions, and their importance for home agriculture.]—*Dtsch. Landw.*, 5, 1, pp. 27–29, 1954.

General information on the functions and organization of the plant inspection service in the German Democratic Republic is followed by a commentary on the provisions of the Plant Import Order of 13th October, 1953 [see next abstract].

Anordnung zur Verhütung der Einschleppung von Pflanzenkrankheiten und -schädlingen (Pflanzeneinfuhrordnung). Vom 13 Oktober 1953. [Order for the prevention of introduction of plant diseases and pests (Plant Import Order). Of 13th October, 1953.]—*Dtsch. Landw.*, 5, 2, pp. 106–107, 1954.

The following are among the provisions of the above-mentioned Order, restricting the importation of plants into the German Democratic Republic. To prevent the

introduction of *Chalara quercina*, *Endothia parasitica*, *Nectria coccinea*, *Ophiostoma* [*Ceratostomella*] *ulmi*, *Dasyscypha* [*Trichoscyphella*] *willkommii*, *Rhabdocline pseudotsugae*, *Adelopus* [*Phaeocryptopus*] *gaeumanni*, and *Cronartium ribicola*, no living hard or softwood material may pass the customs or traffic frontier of the Republic.

Duly authenticated health certificates are required for consignments of azaleas in respect of freedom from *Septoria azaleae* and *Exobasidium azaleae*, while flowering bulbs must be similarly guaranteed as uncontaminated by *Pseudomonas hyacinthi*, *Sclerotinia bulborum*, *Sclerotium tuliparum*, *Botrytis parasitica* [*B. tulipae*], and (in the unripe state) by *Penicillium* sp.

The importation of potatoes is permissible only if the place of origin is at least 2 km. distant from the nearest focus of wart disease [*Synchytrium endobioticum*] and if no infection by this pathogen or *Spongospora subterranea* is detected by a qualified inspector at the place of entry.

Dicotyledonous woody plants must be free from crown gall *Pseudomonas* [*Bacterium*] *tumefaciens*.

Plant quarantine announcements.—*F.A.O. Pl. Prot. Bull.*, 2, 2, pp. 30–32, 1953.

Plant quarantine regulations issued between February and August, 1953, controlling the importation of plants and plant materials into Honduras, Trinidad and Tobago, and Uruguay, and dealing with phytosanitary inspection in Viet-Nam [see next abstract], are summarized.

Plant quarantine announcements.—*F.A.O. Pl. Prot. Bull.*, 2, 3, pp. 46–48, 1953.

Plant quarantine regulations issued in August and September, 1953, controlling the importation of plants and plant materials into Mauritius, the Netherlands, and Viet-Nam [see preceding abstract] are summarized.

Bawden (F. C.). **Plant pathology department.**—*Rep. Rothamst. exp. Sta., 1952*, pp. 79–92, 1953.

In further studies with the aid of ultra-violet light on the movement and distribution of viruses in leaves [*R.A.M.*, 33, p. 406] much evidence was obtained that when leaves are irradiated only the epidermal cells are affected. Virus in these cells can be inactivated and the production of lesions in inoculated leaves prevented by ultra-violet light. Irradiating *Nicotiana glutinosa* leaves for 18 to 24 hours after inoculation with tobacco mosaic virus usually prevented lesion formation, whereas similar treatment of French bean [*Phaseolus vulgaris*] for 8 to 12 hours after inoculation with tobacco necrosis virus generally had no effect. This difference shows that different viruses require different periods of time to multiply in and move from the epidermal cells. Infection was equally prevented by irradiation whether or not the inoculum contained a substance which increases the number of lesions. The suggestion that these substances may facilitate infection by introducing virus particles into cells other than those of the epidermis appears, therefore, to be unfounded.

F. C. Bawden, Brenda Hamlyn, and Marion Watson showed that when both surfaces of leaves infected with the viruses of cabbage black ring spot or henbane mosaic [32, p. 10] were irradiated with ultra-violet, the sap expressed from them was only about one-fifth as infectious as that from comparable unirradiated leaves, though the epidermal cells, in which the viruses occur predominantly, comprise only one-fifth of the total leaf volume. With a short feeding time, which normally gives the largest number of transmissions, aphids seldom transmitted these viruses from irradiated leaves; when they were left for 24 hours before transfer to healthy plants, only a few gave transmissions, whether they had been feeding on irradiated or unirradiated leaves, but the figures were about equal. It appears that aphids

can acquire this type of virus from deep-seated cells, though with much greater difficulty than from the epidermis.

Aphids fed for one minute on leaves infected with sugar beet yellows virus did not transmit it, but transmission became increasingly probable the longer the feeding period. This virus was transmitted about as frequently from irradiated as from unirradiated leaves, the aphids probably acquiring it from the phloem.

A. Kleczkowski showed that when tobacco mosaic virus is irradiated its resistance to denaturation by heat is changed, but the alteration is not directly correlated with changes leading to loss of infectivity, for the two properties are not affected simultaneously, and much more intense radiation is required to affect the rate of heat denaturation than to destroy infectivity.

The extent to which thiouracil inhibits virus production [32, p. 515] was ascertained by F. C. Bawden and B. Kassanis to depend largely on the physiological condition of the leaves. More virus is formed in cut leaves if they are floated on solutions of sugar and phosphate than if they are floated on water, and if they are illuminated than if they are kept dark, especially if they are floated on water. Thiouracil causes the greatest decrease in virus production where this would otherwise be greatest. Used with viruses and hosts reacting with necrotic local lesions, thiouracil resembles trichothecin [32, p. 364] in that solutions sprayed over leaves within a day of inoculation prevent the production of lesions; it also arrests the multiplication of tobacco mosaic virus in tobacco leaves after it has been proceeding for three or four days. The virus already formed seems to be unaffected, but the treated leaves develop necrotic lesions not induced by either the virus or thiouracil alone.

When *Datura stramonium* plants inoculated with tomato bushy stunt and cucumber mosaic viruses and presenting severe systemic symptoms were maintained continuously at 37° C. [32, p. 538] the new shoots looked healthy, and no virus could be obtained from them by sub-inoculation. Most of the cuttings taken from these shoots after four to five weeks at 37° grew into healthy plants in which no virus could be detected, nor could it be found in the parent plants, but after three to four weeks under glasshouse conditions, those originally infected with tomato bushy stunt virus again produced symptoms, and virus was recovered from them. Healthy cuttings and plants were also secured from new shoots that developed on carnation plants systemically infected with carnation ring spot virus and maintained at 37°. This work was done by B. Kassanis.

Marion Watson reports that the necrotic strain of sugar beet yellows virus (N) [33, p. 460] is more readily transmitted by aphids than common yellows. With isolates of the six virus strains associated with yellowing [loc. cit.] fewer transmissions were obtained when test plants were colonized with numerous aphids than would be expected from the number obtained with one. Yellows and the N strain caused more severe leaf symptoms and greater reduction in weight of tops in plants colonized with many infective aphids than in those colonized with few. Plants with mild symptoms were often obtained following transmission of yellows by colonizing with few aphids; this occurred less frequently with N. Virus transmission from such plants gave many plants with mild symptoms, and sap from these, unlike that from plants infected with the mild yellowing viruses from Eire and the United States [loc. cit.], invariably precipitated with antiserum prepared against yellows virus. The ability of aphids to infect with yellows and N greatly diminished within a day of leaving infected plants, and no infections resulted after 72 hours, though one of the mild yellowing viruses persisted in the vector for five days.

Observations by J. W. Blencowe at Dunholme, Sprowston, and Rothamsted showed that aphids were more numerous at first on early-sown beets, but the largest populations finally developed on those sown last. *Aphis fabae* [31, p. 467] was

numerous at all centres, whereas *Myzus persicae* [loc. cit.], numerous at Dunholme and Sprowston, was rare on beet at Rothamsted. Yellows symptoms first appeared on a few early-sown plants early in July after singling, but spread was more rapid in beet sown later. At Dunholme and Sprowston almost all the plants became infected by the autumn, but at Rothamsted only a few were infected. The heaviest yields resulted from beets sown and singled early.

Cattrall, R. Hull, and Osborne report that in June, 1952, 131 samples (grown at Dunholme) of stecklings used for sugar beet seed in Great Britain [32, p. 295] had a mean of 0·7 per cent. plants with yellows. Infection was lowest in 12 beds under cover crops (mean 0·3 per cent., range 0 to 2·5) and 34 beds sprayed and grown under cover crops (0·1 and [0] to 1·5). In further experiments by L. F. Gates with systemic insecticides on steckling beds early spraying (31st August and 10th September) gave the greatest reduction of yellows. Experimental evidence from root crops showed that many infective aphids entered the crop while the plants were very small. Three sprayings in June and July reduced the incidence of yellows at the end of August by 50 per cent. and by mid-October by 30 per cent.

In glasshouse experiments by C. E. Cornford *Rhopalosiphoninus staphyleae* transmitted the N strain of yellows about half as frequently as *M. persicae*; it transmitted sugar-beet mosaic virus to one plant in 15, but did not transmit yellow net virus [33, p. 460].

R. Hull has shown that when the effects of a virulent and a mild strain of yellows virus were compared, the mean sugar yield for nominally healthy plots (which became infected later) was 55·4 cwt. per acre, as against 49·8 cwt. for mild yellows and 42·3 cwt. for necrotic yellows. Thirty-two single-plant progenies raised in isolation plots with sister plants all reacted similarly when infected experimentally with mild yellows, though some reacted more slowly, or with beet mosaic virus. They differed strikingly, however, in their reaction to cucumber mosaic virus, all the plants of some progenies being severely affected, whereas others had only small, ephemeral, local lesions. With yellow net virus some progenies displayed brilliant systemic symptoms on most plants, whereas other progenies had only local symptoms or none.

Of 12 species of aphids tested by L. Broadbent and G. D. Heathcote, *Brevicoryne brassicae*, *M. persicae*, *M. ascalonicus*, *Aulacorthum circumflexum*, *Macrosiphum euphorbiae*, *Megoura viciae*, and *Sappaphis radicicola* transmitted cauliflower mosaic virus [33, p. 407] and cabbage black ring spot virus [loc. cit.], while *Hyperomyzus lactucae* transmitted the former only. The viruses seem to spread in the field only when either *Myzus persicae* or *B. brassicae* is active. Both viruses invade the young leaves of recently infected seedlings, but whereas cauliflower mosaic remains evenly distributed throughout the plant, black ring spot occurs mainly in the older leaves. Migrating aphids usually alight on middle and upper leaves, from which the former virus is much more readily transmitted than the latter, which may explain why the former is usually the more prevalent. A reduction of virus incidence was achieved by increasing the density of plant population and by barriers round the beds, strips of barley and wheat giving better results than mustard and kale or simple physical barriers.

In an experiment by L. Broadbent in 1952 Stock Seed Majestic potato tubers infected separately with virus Y [loc. cit.] and leaf roll virus [32, p. 691] were introduced into the crop to give 0·65 per cent. infection with each. Following seven applications of DDT, parathion, isopestox, dieldrin, and toxaphene at intervals of 10 to 14 days there was at harvest, 0, 0, 0, 10, and 5·1 per cent., respectively, of plants infected with leaf roll per 5 plants on each side of the infectors, as compared with 23·9 per cent. for the unsprayed, the corresponding figures for virus Y being 14·6, 15·6, 26·5, 31·3, 30·5, and 50·8.

Some of the results of air spore trapping [cf. 31, p. 618; 33, p. 41 and below, p. 615] by P. H. Gregory, J. M. Hirst, and F. T. Last have already been noticed. They also showed that (1) the absolute number of spores per cu. m. of air over a period of one day cannot be calculated from catches in a non-suction spore trap; (2) on days with the same mean wind speed the efficiencies of both the horizontal slide and vertical cylinder varied by a factor of ten; (3) the number of spores of any type caught per sq. cm. by the suction trap was more than 100 times as many as on the horizontal slide, while the vertical cylinder caught relatively more pollens and fewer spores of smut fungi, *Cladosporium*, and *Alternaria* than the suction trap.

J. M. Hirst states that the meteorological data for 'Beaumont periods' [32, p. 585] were more frequently correlated with outbreaks of potato blight (*Phytophthora infestans*) when taken at crop level than when measured in Stevenson screens, but there were too many inaccuracies to encourage further investigation of the method.

According to I. Macfarlane, growing cabbages, rye grass [*Lolium* spp.]. and poppies in soil infested by *Plasmodiophora brassicae* [32, p. 3; 33, p. 573] reduced subsequent infection of susceptible hosts; in one experiment the proportion of infected test plants dropped from 57 per cent. after fallow to 28 per cent. after cabbage, and 19 per cent. after rye grass. Fresh isolates from cabbage stock material gave 100, 1, 0, 21, and 12 per cent. diseased plants in cabbage, turnip, swede, radish, and cress (*Lepidium sativum*), respectively, the corresponding figures for swede inoculum being 100, 68, 100, 0, and 88 per cent. The stage of development of the gall from which the spores are extracted appears largely to determine germinability. Suspensions from the galls may contain up to 25 per cent. empty spores, indicating that spores can germinate as soon as the host cell dies. Spores were suspended in water at 5° C. for several months without apparent deterioration.

In an experiment by Mary D. Glynne and G. A. Salt to test the effects of two years under different crops in freeing land from *Cercosporella herpotrichoides*, *Ophiobolus graminis* [33, p. 408], and weeds, winter wheat following wheat or barley had 60 per cent. eyespot and yielded 24·3 cwt. per acre; in April 16 per cent. of the plants had take-all, but ammonium sulphate reduced it to 2 per cent. at harvest. Where wheat followed oats or spring-sown rye grass after a non-susceptible crop, only 14 per cent. of plants were affected by eyespot, there was no take-all, and yield was 35·7 cwt. per acre. In another experiment wheat following wheat had 77 per cent. eyespot and 17 per cent. take-all; one year's freedom from wheat and barley reduced the figures to 38 per cent. and 2 per cent., respectively; two years' freedom, with rye grass in autumn, gave 24 and 1 per cent.; and with potatoes instead of rye grass the corresponding figures were 1 and 0 per cent.

Mary D. Glynne reports that *Gibellina cerealis* [24, p. 184] was found in 17 of 18 years in a field at Rothamsted with an alternate wheat and fallow experiment, but nowhere else in Britain. It is as prevalent after three years' fallow as after one and affects individual plants severely. It infects barley, rye, and both Italian and perennial rye grass [*Lolium multiflorum* and *L. perenne*].

In field experiments by L. F. Gates sugar beet seed treated with panogen or ethyl mercury phosphate gave significantly better emergence than that treated with agrosan, granosan M, or thiram. The best emergence (56 seedlings per gm. of seed) was from seed dipped for 20 minutes in ethyl mercury phosphate solution at 30 p.p.m., the corresponding figures for agrosan and untreated being 49·9 and 37·4.

C. E. Cornford found that keeping the leaves of sugar beet seedlings grown out of doors continuously wet for two days retarded their growth and significantly increased the proportion that resisted attack by *Peronospora schachtii*. Wetting potato leaves retarded their growth but increased their susceptibility to *Phytophthora infestans*.

Jahresbericht der Biologischen Bundesanstalt für Land- und Forstwirtschaft in Braunschweig 1952. [Annual report for 1952 of the Federal Biological Institute for Agriculture and Forestry at Brunswick.]—108 pp., 11 figs., 1 graph, 1 map, 1954.

Much of the information in this report [cf. *R.A.M.*, 32, p. 612], edited by H. Richter, has already been noticed from other sources.

O. Bode (p. 34) obtained positive results on two species of *Lycium* in inoculation tests with potato viruses A and Y, tobacco necrosis virus, and a strain of potato stem-mottle virus, all of which induced brown necroses, while tobacco mosaic, potato bouquet [32, p. 274], and cucumber mosaic viruses caused the formation of dark green lesions.

The results of studies by L. Quantz on legume viroses [33, p. 517] are summarized on pp. 36–38. The examination of 74 bean [*Phaseolus vulgaris*] seed samples disclosed 1 to 10 per cent. infection by bean mosaic virus in 23 per cent. and 0 to 1 per cent. in the rest. Doppelte holländische Prinzess bean plants already infected on emergence or before flowering by bean yellow mosaic virus produced 41·5 per cent. diseased seed compared with only 0·6 per cent. for post-floral infection.

A mosaic virus of broad bean [33, p. 461] was more prevalent in the seeds of horse beans than in the small seeded broad bean varieties, a considerable proportion of the former having 1 to 3 per cent. infection compared with a trace in 92·5 per cent. of the latter. True broad bean mosaic virus [loc. cit.] is thought to be largely responsible for the disease commonly designated 'broad bean mosaic', in which, however, two other viruses are also concerned. The incidence of seed infection ranged from 2·5 to 15 per cent.

Vicia villosa was definitely established as a host of pea enation mosaic virus [31, p. 587], which is now known to affect some 50 German and foreign pea varieties. In J. Völk's aphid transmission experiments with this virus (p. 39) *Macrosiphum* [*Acyrthosiphon*] *pisum* and *M. solanifolii* [*M. euphorbiae*] proved to be even more efficient vectors than *Myzus persicae*, which transmits a high percentage of infection.

The *Aspergillus niger* test for the determination of trace elements in soil [29, p. 171] was found by C. Stapp and C. Wetter (p. 42) to be highly sensitive, demonstrating the presence of molybdenum within a range of 0·02 to 0·0001γ, copper from 5 to 0·05γ, zinc from 10 to 0·1γ, and iron from 20 to 0·1γ.

In experiments in 1951 and 1952 by R. Bartels (pp. 46–47) to ascertain whether virus X could be transmitted to any major extent through the root system of potato plants [31, p. 535] the maximum incidence in seven varieties was 3 per cent., so that this mode of dissemination is unlikely to prove of practical importance.

[H.] Rabien reports (p. 59) that 80 of the 100 potato selections submitted for final tests in three localities were certified as immune from wart disease [*Synchytrium endobioticum*: 33, p. 14 and below, p. 624].

The analysis by H. Rabien and [A.] Noll (p. 60) of 145 samples of wheat yellow rust [*Puccinia glumarum*: 32, p. 612] resulted in seven isolations of race 5, 100 of race 7, one each of races 8 and 46, and two of race 54.

H. Thiem (p. 77) states that the apple varieties chiefly attacked by *Monilia* [*Sclerotinia* spp.: 32, p. 611] on damp sites at the Horticultural Institute, Heidelberg, are Duchess Olga, Ruhm von Kirchwärder, Red and White Astrakhan, Deans Codlin, James Grieve, Klar, Gravensteiner, and Speckled Cardinal.

Verticillium albo-atrum was responsible for abortion of the older buds of plum trees [cf. 29, p. 265] in an orchard at Worms, according to H. Hochapfel (p. 77). Defoliation ensued, except on the current year's shoots, and blackish discolorations developed in the tracheae of the xylem.

H. Thiem and H. Hochapfel (p. 78) record a high incidence of cherry leaf spot (*Cylindrosporium padi*) [*Coccomyces heimalis*: see below, p. 610] in the Black Forest,

Allgäu, Lower Saxony, and Oldenburg. In the south of Württemberg-Baden plum rust (*Puccinia pruni-spinosae*) [C.M.I. map No. 223] was unexpectedly severe.

Details and a map are given of the distribution of beet yellows virus, with observations on the epidemiology and other aspects of the disease [*R.A.M.*, 33, p. 194], by A. Heiling, W. Steudel, and [Frl. F.] Burckhardt (pp. 82–85).

W. Gärtel (p. 106) observed at the Viticultural Institute, Bernkastel-Kues, that the first buds of vines suffering from severe boron deficiency [32, p. 363] are shed before flowering in consequence of the irreversible occlusion of the vascular system and heavy damage to the medulla by an aggregation of necrotic lesions both in the bud stalks and the apical shoot. These internal necroses are of diagnostic value.

Hopper (R. M.). **Progress Report, Dominion Experimental Farm, Brandon, Manitoba, 1948–1952.**—46 pp., 6 figs., 1954.

In the section on cereals by W. H. Johnston (pp. 15–20) in this report it is stated that the wheat varieties Lee, Stewart, Mindum, and Carleton yielded an average (1949–52) of 51·7, 48·2, 42·2, and 41·3 bush. per acre and bore 1 per cent., a trace to 5 per cent., a trace, and a trace, respectively, of leaf [brown] rust [*Puccinia triticina*: *R.A.M.*, 32, p. 667]. The wheat variety Selkirk (CT. 186) [loc. cit.], resistant to race 15 B of stem rust (*P. graminis*), outyielded Thatcher and Redman in tests in Manitoba in 1952. A new oat variety, Fortune, resistant to smut [*Ustilago kolleri* and *U. avenae*: loc. cit.], has been recommended for northern Manitoba, but does not yield as well in most areas as the more popular Exeter. Varietal trials, averaged over the five years 1948 to 1952 at Brandon, showed that Fortune headed the list with 18 per cent. stem rust and yielded 107 bush. per acre, while Exeter with 13 per cent. rust yielded 105·7 bush. per acre. Another recently developed oat variety, Rodney, has high [unspecified] disease resistance but is susceptible to the new race of stem rust, 7A [loc. cit.]. Races 8, 10, and 11 have been building up and now constitute about half the stem rust inoculum in the country.

The fodder barley variety, Vantage, has high stem rust resistance, infection averaging 2 per cent. over eight years, heads that do not break off easily, and a high average yield (76·6 bush. per acre) over a wide range of conditions. Another stem rust resistant fodder barley, Husky, has been produced in Saskatchewan but matures later than Vantage.

H. H. Marshall reports in the horticulture section (pp. 24–25) that chlorosis is a serious problem in trees and even vegetables in many places on the prairie, particularly on heavy clay soils.

Palmer (A. E.). **Progress Report, Experimental Station, Lethbridge, Alberta, 1947–1952.**—51 pp., 11 figs., 1954.

Most of the information of phytopathological interest in this report [cf. *R.A.M.*, 28, p. 442] has already been noticed in this *Review* [32, pp. 664, 674, *et passim*]. During the period covered by the report, approximately 2,025 lucerne lines, totalling 48,000 plants, have been tested at Lethbridge for resistance to wilt [*Corynebacterium insidiosum*: 32, p. 665]; 31 per cent. were obtained from wilt-free plants in neighbouring infested fields, and 165 of them proved to be wilt-free when exposed to controlled epidemics of the disease. They were placed in the polycross nursery and in 1952 a polycross of nearly 500 resistant lucerne clones from various other Stations was established at Lethbridge and Saskatoon; selected lines will be combined eventually into a single wilt-resistant variety.

Annual Report of the Department of Agriculture, Dominica, for the year 1950.—25 pp., [? 1954].

In this report [cf. *R.A.M.*, 32, p. 367 and next abstract] it is stated that during 1950 banana Sigatoka disease (*Cercospora musae*) [*Mycosphaerella musicola*: loc. cit.] increased in Dominica. Infection, however, was mild, but it was believed that unless extensive control measures [33, p. 212] were instituted fruit would soon become affected. Panama disease (*Fusarium* [*oxysporum* f.] *cubense*) [29, p. 351] was prevalent on Gros Michel bananas, only a few stands of which remain, as this variety has been replaced by Lacatan. The most serious disease of cacao was black pod (*Phytophthora palmivora*) [26, p. 146]. Severe losses were caused to tomatoes and eggplants by wilt [?*Corynebacterium michiganense*: 32, p. 367], though the Rosita eggplant and three varieties of Canary Island tomatoes [loc. cit.] continue to be very resistant.

Annual Report of the Department of Agriculture and Forestry, Dominica, for the year 1951.—49 pp., [? 1954].

In this report [see preceding abstract] it is stated that during 1951 banana leaf spot [*Mycosphaerella musicola*: loc. cit. and next abstract] was serious in Dominica, causing severe damage in areas with insufficient water. With the provision of additional spraying equipment, which has been ordered, it is hoped to bring the disease under control. Vanilla root rot (*Fusarium batatis* var. *vanillae*) [*R.A.M.*, 32, p. 367] continues to threaten the industry, particularly in badly drained areas.

Wright (J.). **Investigations 1952.**—*Bull. Dep. Agric. Jamaica* (N.S.) 50, 122 pp., [? 1953].

In the section on plant pathology in this bulletin [cf. *R.A.M.*, 33, p. 212] H. C. James states that four plant diseases new to Jamaica have been reported: chlorotic streak disease of sugar-cane [C.M.I. map No. 29], which must have been present for at least three years but is not responsible for any severe damage; brown stripe of sugar cane (*Cochliobolus stenospilus*); tomato ring spot virus; and *Piricularia oryzae* on rice [No. 51].

Single sugar-cane plants of the island varieties have been observed with mild symptoms of tangle top or mechanical pokkah boeng, not to be confused with *Fusarium* pokkah boeng (*F. moniliforme*) [*Gibberella fujikuroi*: No. 191]. The most common symptom of tangle top is a narrowing and chlorotic condition of the bases of diseased leaves. A small number of canes were affected by red rot (*Colletotrichum falcatum*) [*Physalospora tucumanensis*: No. 186].

The 1951 hurricane combined with wet weather increased the incidence of bud rot of coconuts (*Phytophthora palmivora*) [*R.A.M.*, 33, p. 213] and leaf blight (*Pestalotia* sp.) [*P.* ? *palmarum*: cf. 29, p. 89]. The 'unknown disease' [31, p. 383; 33, p. 294] is slowly moving inland. Occasionally palms in the east of the island exhibit pathological symptoms which are not traceable to any causal agent and are also not cases of the unknown disease.

Malformations like witches' brooms have been found on cacao and *Cola* near Fort George, St. Mary, but so far *Marasmius perniciosus* [cf. 29, p. 147] has not been identified amongst isolates from diseased tissue.

Banana leaf spot [*Mycosphaerella musicola*: see preceding abstracts] was very prevalent during 1952, owing to inadequate spraying and weather favourable to the disease. Further work on various aspects of spraying for control of this disease is in progress.

Plant diseases. Powdery mildew of Pumpkins and related plants. Seed-borne diseases and their control. Snapdragon rust—a serious disease new to

Australia. New plant diseases.—*Agric. Gaz. N.S.W.*, 64, 1, pp. 29–35, 7 figs., 1953.

Notes are given on *Erysiphe cichoracearum* [*R.A.M.*, 33, p. 211] on cucurbits and on the control of seed-borne diseases with reference to specific pathogens. The information on *Puccinia antirrhini* on antirrhinum in Australia has been noticed elsewhere [33, p. 316]. New records for New South Wales since June, 1952 [33, p. 210], include *Uromycladium notabile* [cf. 22, p. 482] on *Acacia dealbata* and *A. farnesiana*, *Pseudomonas syringae* on pear [29, p. 468], and *Puccinia rhei-undulati* on rhubarb [25, p. 365].

Outbreaks and new records.—*F.A.O. Pl. Prot. Bull.*, 2, 4, pp. 60–62, 1954.

It is reported from New Zealand that the evidence now suggests that cherry marbling, formerly attributed to a virus, is a chimera. *Verticillium* wilt of hops, reported to be caused by *V. dahliae* [*R.A.M.*, 33, p. 281], is now stated to be due to *V. albo-atrum* [33, p. 70], the host range of which in New Zealand includes cucumber, potato, strawberry, tobacco, and tomato.

IV Conferencia Interamericana de Agricultura. Segunda Reunión Regional Latino-americana para la Agricultura y la Alimentación. Trabajos Técnicos. [Fourth Inter-American Conference on Agriculture. Second Latin-American Regional Reunion for Agriculture and Nutrition. Technical studies.]—552 pp., 11 figs., 4 diags., 8 graphs, 2 maps, 1950. [Received June, 1954.]

The following papers presented at the above-mentioned Conference, sponsored by F.A.O., are concerned with subjects of phytopathological interest. V. Gheorghianov and G. J. Fischer (pp. 210–224) report on the maize smut situation at the Phytotechnical Institute, La Estanzuela, Uruguay, during the period from 1942 to 1949. In addition to *Ustilago maydis* [*R.A.M.*, 30, p. 608], which constituted 90 per cent. of the samples examined, *Sorosporium reilianum* [*Sphacelotheca reiliana*: C.M.I. map No. 69], *Ustilago fischeri* [*R.A.M.*, 15, p. 435], and other apparently intermediate forms were present on 5, 2, and 3 per cent., respectively. The analysis of samples from Venezuela yielded similar results. The average incidence of the disease on commercial varieties was 5 per cent. A selection designated Cuarentón showed a high degree of resistance.

J. R. Magness (pp. 226–227) lists a number of well-known plant diseases and the fungicides employed for their control in the United States.

K. S. Quisenberry (pp. 502–508) briefly summarizes the projects in hand at various sections of the Bureau of Plant Industry, United States Department of Agriculture, for the breeding of varietal resistance to a number of diseases of economic importance, information on which has been published from time to time in this *Review*.

Late reports on newer varieties.—*Seed World*, 74, 8, p. 37; 9, p. 22, 1954.

A new, high yielding sunflower variety, Synthetic 1, resistant to rust [*Puccinia helianthi*: *R.A.M.*, 29, p. 291], is being tested at Morden, Manitoba.

Bonneville barley, with considerable resistance to mildew [*Erysiphe graminis*: 33, p. 531] and loose smut [*Ustilago nuda*: 33, p. 415], is becoming increasingly popular in the irrigated areas of Oregon, Utah, and Idaho.

Adams rye, produced by the Wisconsin [Agricultural Experiment] Station, is comparable with Imperial in resistance to rust [*Puccinia* spp.].

Burley 11A and Burley 11B, two new tobacco varieties resistant to black shank [*Phytophthora parasitica* var. *nicotianae*: 33, p. 119], have been released by the United States Department of Agriculture Research Service and the Tennessee Experiment Station.

The South Dakota [Agricultural Experiment] Station announces a new, early, yellow, dryland oat variety, Dupree, resistant to race 8 of stem rust [*P. graminis*: cf. 33, p. 475] and to Victoria blight [*Helminthosporium victoriae*: 33, p. 476].

Cornell M-4, a new hybrid maize variety resistant to [unspecified] root and stalk rots, is recommended for grain purposes at elevations of 400 to 1,200 ft., for silage at elevations of over 1,200 ft., and for northern areas of New York State.

Pungo, a new high-yielding, medium-early potato variety highly resistant to blight [*Phytophthora infestans*: 33, p. 498], is announced by the United States Department of Agriculture as suitable for growing in south-eastern areas. It has given good results in tests in South Carolina, Florida, Texas, and Louisiana.

A new pickling cucumber resistant to scab [*Cladosporium cucumerinum*: 33, p. 135] and [cucumber] mosaic [virus: 30, p. 20] has been developed at the Wisconsin [Agricultural Experiment] Station from a cross between Wisconsin SR–6 (scab resistant) [32, p. 360] and a mosaic resistant line from New York. The variety is expected to be available soon.

Annual Report of the Department of Agriculture, Gold Coast, for the year 1951–2. —25 pp., 1953.

In this report [cf. *R.A.M.*, 28, p. 161] it is stated that in May, 1951, compulsory cutting out of cacao trees in the Gold Coast for the control of swollen shoot virus disease [32, p. 13; 33, p. 215 and next abstract] ended, though a Government statement declared that cutting out was still the approved method, and called upon farmers to co-operate. To encourage such co-operation a 'new deal for cocoa', greatly increasing grant payments, was prepared. In August it was announced that because of the expense entailed all attempts at control would be discontinued in the mass-infected and devastated areas of the Eastern Province, except where control had already been established or was in sight. This new voluntary system met with very little response, and by the end of March, 1952, the number of untreated outbreaks had greatly increased and less than one-tenth of the farms initially treated were under regular re-inspection and re-treatment. In many areas spread of the disease was virtually unchecked.

In Ashanti 265 further outbreaks were found, of which 137 could not be treated. Less than 20 per cent. of initially treated farms were being retreated at the end of the year. By March, 1952, 1,151,861 acres of cacao had been examined and the equivalent of 2,500 acres cut out.

In the Western Region there were 371 known untreated outbreaks in March, 1952, and less than 20 per cent. of initially treated farms were under re-treatment. Of 40,915 acres surveyed, about 1,500 have been cut out. In the Eastern Province the number of known untreated outbreaks in the area of scattered disease rose during the year from 114 to 3,021. In Togoland and Trans-Volta infection is spreading in the Kpeve and Peki areas. Up to March, 1952, 162,000 acres had been surveyed and 200 cut out.

Tinsley (T. W.) & Usher (G.). **A colour test for detecting swollen shoot disease in Gold Coast Cacao.**—*Nature, Lond.*, 174, 4419, p. 87, 1954.

A modification of the technique of Lindner *et al.* [*R.A.M.*, 31, p. 127] here described for detecting cacao swollen shoot virus chemically was developed at the West African Cacao Research Institute, Tafo, Gold Coast. Ten gm. of mature leaves are ground with 25 ml. distilled water and squeezed through muslin; 2 ml. of the extract are heated to boiling-point with an equal volume of normal sodium hydroxide and the cooled mixture centrifuged at 8,000 r.p.m. for two minutes to clarify it. The volume of supernatant fluid is made up to 6 ml. by the addition of more sodium hydroxide. Infected leaves give a red-brown to crimson coloration and healthy ones a green or greenish-brown. If strictly comparable healthy leaves

are used as a control, the presence of the virus may be diagnosed before the development of external symptoms.

Orellana (R. G.). **Cacao diseases in Venezuela, Colombia, Ecuador and Trinidad.**—*F.A.O. Pl. Prot. Bull.*, 2, 4, pp. 49–52, 1954.

In Ecuador cacao witches' broom (*Marasmius perniciosus*) [*R.A.M.*, 32, p. 71] thrives at altitudes under 700 ft. and causes severe losses at the close of the rainy season. At the Tropical Experiment Station, Pichilingue, 500 clonal selections from Ecuador and elsewhere are being tested; the results indicate that S.C.A.6 is virtually immune and S.C.A.9 and S.C.A.12 are highly resistant [32, p. 424]. The Ecuadorean selections Casa Grande, Santa Isabel, Santa Rosa, Silesia, and Porvenir showed promise.

Pod rot (*Monilia roreri*) causes heavy losses of cacao in Cauca Valley and Valle, Colombia [33, pp. 282, 526], as well as in Antioquia, Caldas, Santander, and Huila. The losses in El Valle are estimated to reach 90 per cent. in some years and to average 30 per cent. Cundeamor and Calabacillo, of the Trinitario group, are most susceptible, while Criollos is somewhat resistant. Successful inoculations (on the six Palmira S.C.P. clones) were obtained only when the pods had been wounded. Control has been achieved by spraying.

Pod rot (*Phytophthora palmivora*) [loc. cit.] does not appear to be serious in central Venezuela [29, p. 355], and is almost insignificant on the hills in Trinidad [26, p. 383]. Preliminary studies at the Imperial College of Tropical Agriculture indicate the existence of at least three strains of *P. palmivora*. Trunk canker caused by the same fungus is very destructive in pure Criollo plantings in the El Bolo area of the Cauca Valley.

The losses caused by *Ceratostomella* [*Ceratocystis*] *fimbriata* [33, p. 144] in Venezuela are now estimated at 3 to 5 per cent. The disease is present in the Ocumare de la Costa region, and appears to be spreading.

Anthracnose (*Colletotrichum* spp.) [21, p. 7] was serious in many plantations in Colombia; clone S.C.P.2 was somewhat resistant. Root rot (*Rosellinia* spp.) [cf. 24, p. 272] killed many trees in wet soils in the Province of Los Rios, Ecuador, and is often troublesome in Colombia [loc. cit.] and Trinidad [cf. 21, p. 162; 26, p. 146].

Katznelson (H.) & Sutton (M. D.). **Bacteriophage in relation to Xanthomonas translucens.**—*Canad. J. Bot.*, 31, 6, pp. 725–729, 1953.

In earlier work by the authors in the Department of Agriculture, Ottawa, the isolation of phages specific for certain variants of *Xanthomonas translucens* from cereal seed suggested their possible use in identifying members of this group [*R.A.M.*, 32, p. 617]. Such a procedure would be simpler and more rapid than plant inoculation or serological techniques [29, p. 461]. Further efforts to isolate other phages, particularly for f.spp. *undulosa*, *cerealis*, and *phlei-pratensis* met with partial success; one phage attacked nearly all the *X. translucens* isolates available. Consequently, additional named cultures were obtained from various sources for more extensive tests. These yielded a phage specific for one isolate of *X. translucens* f.sp. *undulosa* and three polyvirulent phages, of which Pg35 lysed 24 out of 28 isolates of *X. translucens*, the other two being somewhat less active. Attempts to identify cultures of f.spp. *hordei*, *hordei-avenae*, and *undulosa* with specific phages were unsuccessful. However, the use of a phage specific for f.sp. *secalis* to detect homologous cultures gave encouraging results.

Bever (W. M.) & Pendleton (J. W.). **The effect of soil-borne Wheat mosaic on yield of winter Wheat.**—*Plant Dis. Reptr*, 38, 4, pp. 266–267, 1954. [Multilithed.]

In 1953 yields of 25 winter wheat varieties and strains growing in non-infested

areas and soil infested with wheat mosaic virus [*R.A.M.*, 33, p. 418] were compared at the Agronomy South Farm, Urbana, Illinois. A mean loss in yield of 10·83 per cent. was recorded for varieties developing a mild mottle in infested areas; of these, Royal, Saline, and Seneca showed losses of 16·62, 18·11, and 22·72 per cent., respectively, while the yields of Knox, Prairie, Purdue C.I. 12985, and Weston were slightly but not significantly higher in the infested areas. The mean percentage loss in varieties developing severe mottle was 18·54 and in those with rosette symptoms, 80·74.

Pal (B. P.). **The improvement of Wheat in India.**—*Sci. & Cult.*, 19, 11, pp. 540–549, 1954.

Most of the information concerned with diseases in this Presidential Address to the Agricultural Sciences Section of the 41st Indian Science Congress in January, 1954, has already been noticed from other sources [*R.A.M.*, 32, pp. 179, 472, 492; 33, p. 221].

Mehta (P. R.), Singh (B.), Singh (J.), & Mathur (S. C.). **Varietal resistance of Wheat to loose smut (Ustilago tritici).**—*Curr. Sci.*, 23, 1, pp. 20–21, 1954.

Of the 22 wheat varieties tested by artificial inoculation for reaction to loose smut (*Ustilago tritici*) [*R.A.M.*, 30, p. 601; 33, p. 415] at the Government Research Farm, Kanpur, India, in 1951–2 and 1952–3, only Bansi Pali 808, Bansi CP., and N.P. 710 proved resistant (less than 1 per cent. infection). Late sowing increased the percentage of infection in susceptible varieties from between 15 and 36 to 40 to 76.

Luthra (J. C.). **Solar energy treatment of Wheat loose smut (Ustilago tritici (Pers.) Rostr.).**—*Indian Phytopath.*, 6 (*1953*), 1, pp. 49–56, 1954.

A modification of the original solar energy treatment for the control of wheat loose smut (*Ustilago tritici*) in India [*R.A.M.*, 14, p. 22] easily operable by local farmers has been developed over a period of years at the Punjab Agricultural College and the Research Institute, Lyallpur, Pakistan. The grain is presoaked in water for four hours in the shade or in a room and then exposed to the sun for four hours. The treatment held good even when the maximum shade temperature was about 104° F. provided that there was bright sunshine for exposure. This method is in current use in several parts of India and is employed also for the control of other cereal diseases [33, p. 524].

Nicholson (G.). **Wheat varieties recommended for 1953 sowing. Wheat varieties recommended for 1954 sowing.**—*Agric. Gaz. N.S.W.*, 64, 1, pp. 3–5, 42–47, 1 map, 1953; 65, 1, pp. 5–11, 38–40, 1 map, 1954.

Of the 11 wheat varieties recommended for grain production in the various regions of New South Wales in 1953, Bencubbin, Celebration, and Festival are highly resistant to flag smut [*Urocystis tritici*: *R.A.M.*, 27, p. 559], and susceptible, resistant, and highly resistant, respectively, to stem rust [*Puccinia graminis*: 31, pp. 597, 598].

By 1953 wheat yields in New South Wales had increased by five bush. per acre over pre-war harvests. Twelve varieties of wheat are recommended for the 1954 season but only Celebration, Festival, Warigo, and the new varieties Lawrence and Spica [33, p. 342] are stated to be resistant to both flag smut and stem rust. BHC dust has proved efficient in controlling bunt [*Tilletia caries* and *T. foetida*].

Da Matta (E. A. F.). **Doenças do Trigo na Bahia.** [Diseases of Wheat in Bahia.] —*Bol. Sec. Agric. Bahia*, 49, 12, pp. 16–20, 2 figs., 1952. [Received July, 1954.]

Information is summarized in popular terms on the symptomatology and control

of two diseases affecting the wheat crop in Bahia, Brazil, brown rust (*Puccinia rubigo-vera* var. *tritici*) [*P. triticina*] and scab (*Gibberella zeae*).

Мамонтова (Mme A. N.). Об устойчивости Пшеницы к бурой ржавчине. [Concerning Wheat resistance to brown rust.]—Агробиология [*Agrobiology, Moscow*], *1953*, 6, pp. 29–39, 3 diags., 1953.

Experiments at the Pan-Soviet Institute of Plant Protection, Leningrad, U.S.S.R., have shown that the intensity of primary infection by wheat brown rust [*Puccinia triticina*: cf. *R.A.M.*, 32, p. 551] in a particular variety and the rapidity with which the particular strain adapts itself to that variety depends on the variety itself and on those from which the strain of rust was originally taken. The nearness of relationship (in respect of immunity) between the two varieties plays a fundamental part in the adaptability changes of the fungus. Similarly, the rapidity with which a variety loses its resistance depends on how closely related it is to the surrounding, susceptible varieties, the highest and most enduring resistance coming from crosses between forms most distantly related to the varieties sown in a given region. Crossing resistant varieties with susceptible ones is not recommended as it accelerates the loss of resistance and should, therefore, be minimized. Such hybrids should be sown well away from their parent varieties. Hybrids resulting from natural pollination in the field help the adaptability of the fungus to resistant varieties. Spring appearance of rust derives from the susceptible varieties in the previous year's crop. Field rotation should limit the transit of the fungus to the resistant varieties, the resistance of the varieties selected for rotation depending on their parental history in relation to the varieties previously grown in the field.

Keding (F.). **Der Befall des Saatweizens mit Steinbrand im Jahre 1951 und die sich herausgebenden Folgerungen.** [The infection of seed Wheat with bunt in the year 1951 and the consequences arising therefrom.]—*Pflanzenschutz*, 4, 5, pp. 64–67, 1 graph, 1952.

The incidence of wheat bunt (*Tilletia tritici* [*T. caries*] and *T. foetens* [*T. foetida*]) in the Bavarian harvest of 1951 was exceptionally heavy [cf. *R.A.M.*, 29, p. 16 and next abstract], especially in Upper and Lower Bavaria, where 29 and 66 per cent., respectively, of the seed samples were heavily infected (classes IV and V) compared with only 1 and 0 per cent., respectively, in Upper and Lower Franconia. The high degree of infection, e.g. of the Lang-Doerflers Braunweizen Walthari, Langs Weihenstephaner Tassilo, and Firlbeck I varieties, is attributed not only to an inherent susceptibility but also to their predominant cultivation in the most heavily contaminated southern areas of the State. Among the most resistant varieties were Erbachshofer Braun and Engelens Siegfried, while the most susceptible included Ackermanns Bayernkönig.

The analysis of seed samples is considered to furnish a more exact estimate of the incidence of bunt in a crop than can be obtained by a field inspection, resulting in improvement in certification standards. It can further be determined by this method whether the disease in a given region is severe repeatedly or only under particular climatic and meteorological conditions.

Keding (F.). **Ergebnisse der Untersuchung des Saatweizens auf Steinbrandbefall 1951 und 1952 — ein Vergleich.** [Results of the examination of seed Wheat for bunt infection 1951 and 1952—a comparison.]—*Pflanzenschutz*, 5, 5, pp. 67–69, 1 graph, 1953.

In the autumn of 1952, 1,766 wheat seed samples from all the seven administrative districts of Bavaria were examined for bunt [*Tilletia* spp.: see preceding

abstract]. Infection was again highest in Lower Bavaria, where some 56 per cent. of the material submitted fell below the requisite standard, and lowest in Lower Franconia. Varietal reactions to the pathogen were also approximately identical in both years, the heaviest infection occurring on the same varieties as before, with the addition of Schweigers Taca and Engelens Festa, and the lightest on Engelens Siegfried, Wahrberger Ruf, Ackermanns Herold, Hauters II, Zapfs Neuzucht, and Graf Toerring II.

Valder (P. G.). **Yellow leaf spot and pink grain in Wheat.**—*Agric. Gaz. N.S.W.*, 65, 1, pp. 36–37, 1 fig., 1954.

Yellow leaf spot on wheat caused by *Helminthosporium tritici-repentis* [*R.A.M.*, 33, p. 21] has been recorded only in the central and northern areas of New South Wales. As it caused seedling blight only in occasional crops no control measures were necessary. Should the need arise it is proposed to attempt control by cultural methods and the breeding of resistant varieties.

Hsi (C. H.). **Dryland root rot complex of winter Wheat in eastern New Mexico.**—*Plant Dis. Reptr*, 38, 4, pp. 270–274, 1 map, 1954. [Multilithed.]

Environmental conditions favouring disease development, susceptibility of the local commercial varieties, and an abundance of root-rot organisms in the soil were all responsible for the widespread occurrence of dry-land root rot of winter wheat in New Mexico in 1953. Among the fungi isolated from February to July, *Helminthosporium sativum* [*R.A.M.*, 33, p. 474] was the most frequent.

Patel (M. K.), Kamat (M. N.), & Padhye (Y. A.). **A new Helminthosporium on Wheat.**—*Indian Phytopath.*, 6 (*1953*), 1, pp. 15–26, 1 pl., 1954.

Since 1946 wheat in Bombay State has been affected, chiefly at heading time under conditions of moderate temperatures (25° to 30° C.) and prolonged high humidity, by a reddish brown streak disease on the stems, leaves, leaf sheaths, spikes, glumes, and spikelets. Pusa 4 in Poona and Niphad 4 in other districts have suffered 50 per cent. infection in some years. In severe cases the part above a stem lesion dies, the ears droop, and the grain is reduced in size. The pathogenicity of a *Helminthosporium* sp. [cf. *R.A.M.*, 27, p. 315] isolated from the diseased tissues was established, its virulence and rate of development being related directly to the period of incubation under moist conditions. Pot experiments confirmed that the flag leaf stage is the most susceptible to the development of the disease under favourable conditions.

Abundant mycelium develops on Richards's, potato dextrose, and maize meal agar. The minimum, optimum, and maximum temperatures for conidial germination in hanging drop cultures were 5°, 25°, and 42° C., respectively. Optimum growth was secured at 25° to 30° and pH 4 to 6. Sugars stimulated sporulation on Richards's agar. The fungus resembles *H. nodulosum* [26, p. 393] in spore characters and measurements but differs in being restricted to *Triticum* and for this reason is named *H. nodulosum* var. *tritici* n.var. It remained viable for four months in culture and about ten months in the field.

Pot experiments indicated that in most varieties resistance was associated with resistance to stem rust [*Puccinia graminis*] with the exception of Khapli which was highly susceptible to *H. n.* var. *tritici*. Local types were highly susceptible and exotic types highly resistant.

Neto (J. P. da C.). **1. Ataque foliar de carvão do Trigo (Ustilago nuda (Jens.) Rostr.) e carvão nú da Aveia (Ustilago avenae (Pers.) Rostr.). 2. Ocorrência do carvão da Cana no Rio Grande do Sul.** [1. Foliar attack of Wheat smut

(*Ustilago nuda* (Jens.) Rostr.) and loose smut of Oats (*Ustilago avenae* (Pers.) Rostr.) 2. Occurrence of Cane smut in Rio Grande do Sul.]—*Rev. agron., Pôrto Alegre*, 16, pp. 112–115, 2 figs., 1953. [English summary.]

Ustilago tritici and *U. avenae* [C.M.I. map No. 238] are reported on summer wheat and oats, respectively, from Pôrto Alegre, Rio Grande do Sul, Brazil, both being new records for the country. The wheat affected was Ribeiro 6042 of *Triticum aestivum* var. *erythrospermum epruinosum* and the oats Anthony and Green Russian (*Avena sativa*) and Green Mountain (*A. orientalis*). *U. scitaminea* [*R.A.M.*, 33, p. 502] has recently been detected on sugar-cane in Rio Grande do Sul.

Haskett (W. C.) & Murphy (H. C.). **Relative susceptibility of Barley varieties to Pythium graminicola Subr.**—Abs. in *Phytopathology*, 43, 9, p. 474, 1953.

In soil inoculation tests with *Pythium graminicola* [? at Iowa State College, Ames] the most resistant of 34 varieties and hybrids of spring barley [*R.A.M.*, 29, p. 82], judged by the wet root weight values, were Montcalm C.I. 7149, Pillsbury C.I. 7166, Moore C.I. 7251, and Trebi C.I. 936, while the most susceptible included Odessa C.I. 182, Artic C.I. 1470, Vantage C.I. 7324, and Minn. 37–54, C.I. 7256.

Waubay Oats.—*Seed World*, 74, 9, p. 37, 1954.

Waubay oats, highly resistant to race 7 of stem rust [*Puccinia graminis*: *R.A.M.*, 32, p. 247; 33, p. 528] and to Victoria blight [*Helminthosporium victoriae*: 33, p. 476], and intermediate in its reaction to halo blight [*Pseudomonas coronafaciens*: 28, p. 116], is reported for eastern South Dakota. Though not resistant to *Septoria* [*Leptosphaeria avenaria*: 33, p. 476], it stood up well under an extreme attack of the disease at Brookings in 1953.

Rehm (H.-J.). **Versuche zur Bekämpfung von Roggenfußkrankheiten (Fusariosen) durch Saatgutimpfung mit antibiotisch wirkenden Streptomyzeten.** [Experiments on the control of Rye foot rots (fusarioses) by seed inoculation with antibiotically active streptomycetes.]—*Z. PflKrankh.*, 60, 11, pp. 549–560, 4 figs., 1953. [English summary.]

In inoculation experiments with *Fusarium culmorum* and *F. nivale* [*Calonectria nivalis*] on Petkus winter rye at the Agrobiological Institute of the University of Greifswald, Germany, a phytotoxic effect of the peptone-glucose-beer wort agar culture liquids of both fungi was observed. The wilt toxins were not specific and were not absorbed through the roots.

Of 100 strains of *Streptomyces* tested [cf. *R.A.M.*, 33, p. 495], 31 exerted an antibiotic effect on *F. culmorum* [32, p. 539] and 43 on *C. nivalis* without damaging the host. A leaf test, based on Schmidt's method for the rapid laboratory assay of fungicides [31, p. 502], was devised to expedite the analysis of antibiotics in culture solutions. By eliminating the natural microflora of rye seed with a *Fusarium–Streptomyces* mixed infection a substantial increase in germination over that with *Fusarium* alone was secured. Inoculation of the seed with an active strain of *Streptomyces* reduced the incidence of fusariosis by about one-third.

Taylor (G. A.). **The effects of three levels of magnesium on the nutrient-element composition of two inbred lines of Corn and on their susceptibility to Helminthosporium maydis.**—*Plant Physiol.*, 29, 1, pp. 87–91, 1 fig., 1954.

Greenhouse water culture experiments were conducted at the Department of Horticulture, Pennsylvania State College, using two inbred maize lines, Illinois Hy and Ohio 41, grown at three different levels of magnesium for 11 weeks. The young maize plants were then inoculated with a virulent race (Lancaster 2) of *Helminthosporium maydis* [*Cochliobolus heterostrophus*: *R.A.M.*, 30, p. 224; 32,

p. 178] and the resulting lesions compared. In both maize lines an increase in susceptibility (significant only in Ohio 41) was observed with the increase in magnesium concentration between 3 p.p.m. and 75 p.p.m., but no significant difference between the reaction at 75 p.p.m. and at 300 p.p.m., though disease incidence was higher. At the same time a decrease in the nitrogen, phosphorus, potassium, and sulphur contents of infected plants was noted, corresponding to a highly significant increase in the magnesium content.

Melhus (I. E.). **A preliminary study of the diseases of Corn and some related hosts in Guatemala.**—*Iowa St. Coll. J. Sci.*, 27, 4, pp. 519–536, 7 figs., 1953.

In order to ascertain the reactions of various pathogens on the existing strains of maize to various climatic influences in Guatemala, the author carried out studies from 1944 to 1952.

Leaf blight (*Helminthosporium turcicum*) [*R.A.M.*, 32, p. 619] and rust (*Puccinia sorghi*) [29, p. 504] are the most serious leaf diseases. Leaf blight is common at altitudes of 2,000 to 6,000 ft. where the rainfall ranges from 40 to 60 in. [per annum] but not in low tropical or high mountainous climates. Varieties resistant to *P. sorghi* were 47–44 2s, 1613–45 2s, 192–44, 35y, and 1478–45; all belong to the *giganteum* group.

Ear rots (the most prevalent type is caused by *Diplodia zeae*) [29, p. 505] are more virulent in wet than in dry regions and may cause losses of up to 12 per cent. The only control measure practised consists in doubling the stalk below the ear when the grain is nearly mature. This accelerates the drying process which in turn inhibits the growth of ear rot.

Smut (*Ustilago zeae*) [*U. maydis*: loc. cit. and above, p. 591] occurred in traces only. Head smut (*Sphacelotheca reiliana*) [loc. cit.], negligible previous to 1951, caused losses of about 12 per cent. in Antigua [C.M.I. map No. 69] in that year. Smut (*U. dieteliana*) was also found on plantings of *Tripsacum latifolium* [*R.A.M.*, 28, p. 391] near Coban in autumn, 1946, and in each succeeding year. It was readily transferred to maize and teosinte [*Euchlaena mexicana*] which suggests that the species may not be distinct from *U. maydis*.

Various pathogens caused minor foliage diseases: of these *Physoderma zeae-maydis* [*P. maydis*] was observed only in the highlands.

Koehler (B.). **Corn seedling blight in dry soil.**—Abs. in *Phytopathology*, 43, 9, p. 477, 1953.

In greenhouse tests at 70° F. [at Illinois Agricultural Experiment Station] dark silt field loam soil was dried to 13 per cent. moisture and maintained at that level until up to 15 days after planting with maize, when it was adequately watered for a fortnight. No plumules emerged from the dry soil but radicles developed in five days. Delaying germination in this way increased seedling blight [cf. *R.A.M.*, 33, p. 477], but reduction in stand was severe only where the pericarp had been removed from the crown of the seeds and no seed disinfectant was used.

A *Trichoderma* species and an unidentified fungus producing only round, thick-walled, hyaline chlamydospores, 15 to 22 μ in diameter, and septate mycelium, were generally isolated from the interior of grain kept in dry soil for five days or more.

Saccas (A. M.). **Les champignons parasites des Sorghos (Sorghum vulgare) et des Pénicillaires (Pennisetum typhoideum) en Afrique Équatoriale Française (suite.)** [The parasitic fungi of Sorghums (*Sorghum vulgare*) and Millets (*Pennisetum typhoides*) in French Equatorial Africa (continuation).]—*Agron. trop., Nogent*, 9, 3, pp. 263–301, 21 figs., 1954.

In this further contribution [*R.A.M.*, 33, p. 533] 20 fungi (including eight new

species) are described. Leaf blight (*Helminthosporium turcicum*) [32, p. 90] is widespread and sometimes severe on sorghums in Tchad and Ubangui and was observed for the first time at the Loudima Station, Middle Congo, in 1949. *Leptosphaeria eustoma* is commonly present on sorghum leaves in French Equatorial Africa, sometimes causing a greater part of the mature leaves to dry up or killing young plants. *L. grisea*, widespread on sorghum in Tchad and Ubangui, kills leaves of any age, but does not cause important losses. *L. sorgophila*, usually associated with the former on young living leaves of sorghum, was found near M'Baïki; it was often difficult to decide whether it was parasitic or saprophytic.

Mycosphaerella holci [cf. 17, p. 69] was found on young living leaves of sorghum in Ubangui (Lobaye), on young leaves of red 'berbéré' millets (*Sorghum guineense*) at Boukoko, and on old sorghum leaves in Tchad, especially near Moudou, Kelo, and Léré and at the Ba-Illi Station. The fungus was not very common and caused only limited losses. *Nigrospora sphaerica* was frequently found in Tchad and Ubangui as a saprophyte on leaves and sheaths of dead or partially withered sorghum plants at the end of the vegetative period; it was also present on living parts of sickly sorghum plants.

Ophiobolus graminis was observed near the Lobaye river on the bases of sorghum stems; the plants withered and died before or shortly after earing. *O. zeae* [cf. 31, p. 280] occurred on dead and dying sorghum stems, in the vicinity of M'Baïki and Boukoko and was also found in Tchad. *O. leptosporus* n.sp. was found on sheaths of living sorghum plants near M'Baïki in 1953. The affected parts bear large, irregular, ill-defined purple spots; the tissues dry up and turn pinkish-white or develop a discoloration with a pinkish reflection. The sparse, conoid, seldom spherical perithecia measure 350 to 600 by 250 to 450 μ, the cylindrical, briefly stipitate asci are 96 to 195 by 4·7 to 5·5 μ, and the hyaline, later yellowish, 7- to 14-sepate ascospores are 85 to 175 by 1 to 1·5 (mean 147 by 1·35) μ.

Phoma insidiosa [cf. 32, p. 670] was commonly present on mature seed of sorghum panicles and on the leaves of both young and well developed sorghum plants in plantings of early varieties in Tchad, and especially in Ubangui, near the Lobaye river.

Physalospora fusca [cf. 11, p. 697] was found on dead leaves (killed by it) of one month old sorghum plants near M'Baïki, in Ubangui-Chari. *P. sorghiphila* n.sp., found on living and fading sorghum leaves in Tchad, has gregarious, rarely solitary perithecia 180 to 250 μ in diameter. The hyaline, cylindro-claviform, pedicillate, straight or slightly curved asci, rounded at the apex, with numerous filiform, continuous paraphyses longer than the asci, measure 56 to 70 by 11 to 13 μ. The hyaline, unicellular, elliptical, slightly arcuate ascospores, blunt at the extremities, measure 12 to 18·5 by 4 to 5 (average 15·7 by 4·5) μ.

Puccinia purpurea [C.M.I. map No. 212] causes important losses of sorghum in south-western Ubangui. In 1949 it was present at the Loudima Station. In eastern Ubangui and Mayo-Kebbi and Logone (Tchad) it is rare, though common at Fort Archambault, especially in wet localities.

Ramulispora sorghi [*R.A.M.*, 32, p. 90], as common on sorghum in Tchad as *Gloeocercospora sorghi* [33, p. 535], was found on many early varieties at Ba-Illi, certain red-seeded ones being, apparently, severely affected; it was also seen near the Fort Archambault to Fort Lamy route and in many plantations in Mayo-Kebbi, Logone, and Moyen-Chari. It is present also in northern Ubangui.

Phyllosticta sorghiphila n.sp., attacking living sorghum leaves, is widespread in south-western Tchad and northern Ubangui, but the most severe outbreaks occurred in Lobaye on plants one month old, the leaves of which had dried up. The numerous, sparse, rarely gregarious pycnidia measured 60 to 110 μ in diameter, and the hyaline, unicellular, sub-oval to sub-cylindrical pycnidiospores, rounded at the extremities and borne on thin, short sterigmata, measured 5 to 8·5 by 2·5 to 3·5 (mean 6·76 by 2·96) μ.

Мента (P. R.), Singh (B.), & Mathur (S. C.). **A new leaf spot disease of Bajra (Pennisetum typhoides Stapf and Hubbard) caused by a species of Piricularia.**— *Indian Phytopath.*, 5 (*1952*), 2, pp. 140–143, 3 figs., 1953.

A new leaf spot disease of *Pennisetum typhoides* was observed in August and September, 1952, at the Government Research Farm, Kanpur, on inbred lines of the crop. Some lines were severely affected, with large lesions causing extensive damage. A species of *Piricularia* was isolated; this and an isolate [of *P. oryzae*: cf. *R.A.M.*, 27, p. 581; 33, p. 112] from paddy rice were used for cross-inoculation experiments.

The disease appeared within four to six days on over 80 per cent. of *Pennisetum typhoides* plants inoculated with the bajra isolate, first on the lower leaves as small, brown spots. These enlarged into dark brown, circular spots, 0·2 to 0·6 cm., sometimes 1 cm. in diameter, occasionally coalescing into elongated, irregular lesions. Concentric rings in varying shades of brown developed on the lesions, distinguishing this disease from other leaf spots of this host.

Isolates from *P. typhoides* did not infect rice, nor did *Piricularia oryzae* attack bajra and this, together with a difference in width of the conidia and the fact that the apical cell of the bajra isolate is longer and more tapering than that of the rice isolate, suggests that the fungus on *P. typhoides* may be a new species.

Stepanov (K. M.) & Shaluishkina (V. I.). К вопросу о корневой инфекции Лимонов грибом **Deuterophoma tracheiphila Petri.** [On the question of Lemon root infection by the fungus *Deuterophoma tracheiphila* Petri.] —Бот. Журн. [*J. Bot. U.S.S.R.* = *Bot. Zh. S.S.S.R.*], 39, 1, pp. 103–108, 1954.

Two series of experiments, one in a tea plantation where citrus had not been grown previously and the other in a lemon plantation infested with wilt (*Deuterophoma tracheiphila*) [*R.A.M.*, 33, p. 350 and next abstract], were carried out in 1949–50 by the Pan-Soviet Institute of Plant Protection, Leningrad, U.S.S.R., to determine whether it was possible to infect lemon roots with the fungus in the field. In each series three treatments were given: (*a*) artificially wounding the collar of year-old Novogruzinsky seedlings on the 9th of June after a period of heavy rain; (*b*) placing green lemon shoots (2 to 6 cm. long) infected with wilt in the soil round the collar of the seedlings on 31st May and on the 9th June wounding the collar and applying the infected shoots to it; and (*c*) same as (*b*) but not wounding the collar. In the second series also infected lemon cuttings with copious mycelium were applied to the wounded collar of seedlings which had been heavily watered before and after (*d*). Owing to unfavourable climatic conditions the second series was retested in the autumn. Though 17 out of 30 (tea plantation) and 21 out of 60 (lemon plantation) seedlings showed brownish colour and were defoliated, none showed infection except one of the eight seedlings in (*d*). In this the entire main root and all the lateral roots were infected. In addition, natural infection of lateral roots occurred in one seedling, indicating that some kind of root infection, though rare, is possible in the field.

Polyakov (I. M.) & Shumakova (Mme A. A.). Накопление токсина при развитии гриба **Deuterophoma tracheiphila Petri** в различных условиях культивирования. [Toxin accumulation during the development of the fungus *Deuterophoma tracheiphila* Petri under different growing conditions.]— Докл. Акад. Сельскохоз. Наук Ленина. [*Rep. Lenin Acad. agric. Sci.* = *Proc. Lenin Acad. agric. Sci.*], 19, 3, pp. 43–48, 3 graphs, 1954.

Laboratory studies at the Pan-Soviet Scientific Research Institute [? Leningrad] on the influence of different temperatures and pH values of the medium on the citrus wilt fungus (*Deuterophoma tracheiphila*) [*R.A.M.*, 33, p. 292 and preceding

abstract], using strains No. 1 and No. 5, have shown that the development of the fungus and toxin formation occur over a wide range of temperature [cf. 30, p. 413] but hardly at all between 29° and 30° [C.]. Toxin production was greatest between 21° and 24° and was much retarded in strain No. 1 and non-existent in strain No. 5 at low temperatures (—7°). The pH (from 4 to 7·8) of liquid media exerted an effect only during the first days of the experiment, both fungus development and toxin formation being less at an initial pH of 4. As the fungus grew the pH of the medium became more favourable to the fungus, finally (on the 30th day of the experiment) becoming stabilized at 6·6 to 6·8.

Prosser (D. S.), Stearns (C. R.), Thompson (W. L.), & Griffiths (J. T.). **The Florida Citrus grove duster.**—*Bull. Fla agric. Exp. Sta.* 481, 15 pp., 2 figs., 2 diags., 1951. [Received December, 1953.]

Details are given of the construction and field performance of an improved mechanical duster designed especially for Florida citrus groves. It requires only two operators and comprises a fan, intake air duct, non-clogging hopper and double-outlet delivery, and distributing fins mounted on two wheels as one unit on the rear of the chassis, while the engine and driving controls are mounted in front and to one side of the axle. The whole apparatus gives complete protection for the operator and is easily attached to or mounted on a trailer or truck.

Selle (R. M.). **Determination of sour Orange rootstock by paper chromatography.** —*Nature, Lond.*, 174, 4420, pp. 140–141, 1 fig., 1954.

As the result of a paper chromatographic study at the Occidental College, Los Angeles, California, of root bark extracts in a solution of butanol in glacial acetic acid (4:1 in 5 parts water) from ten varieties of citrus seedlings and nine types of rootstocks budded with both Valencia and navel oranges, the author was able to detect sour orange rootstocks. The chromatograms of extracts from this stock, sprayed with ninhydrin, give a yellowish, fluorescent, 'flame-like' spot when viewed under a long-wave ultra-violet lamp (3,600 Å). In view of the fact that these stocks are very susceptible to quick decline [*R.A.M.*, 32, p. 621], this method should prove useful for detecting them in the orchard.

Stout (G. L.). **What's new in plant pathology.**—*Bull. Calif. Dep. Agric.*, 43, 1, pp. 25–32, 1954.

In this summary of a talk given to the California State Association of County Agricultural Commissioners on 2nd December, 1953, the progress in current research problems in the United States, most of which has been noticed in this *Review*, is briefly outlined.

Further work on [citrus] quick decline [*R.A.M.*, 33, p. 24 and preceding abstract] and tristeza [32, p. 677] indicates that they are both caused by forms of the tristeza virus. Transmission tests have proved the presence of the disease in Florida [loc. cit.] and a similar disease has been reported from Louisiana. Tristeza is so mild in Florida that it became widespread before it was recognized.

Sequeira (L.) & Steeves (T. A.). **Auxin inactivation and its relation to leaf drop caused by the fungus Omphalia flavida.**—*Plant Physiol.*, 29, 1, pp. 11–16, 2 figs., 2 graphs, 1954.

In studies at the Biological Laboratories, Harvard University, Massachusetts, it was demonstrated that comparable mechanical injury does not duplicate the defoliating effect of *Omphalia flavida* [*Mycena citricolor*] on coffee [*R.A.M.*, 33, p. 351] and *Coleus*. Evidence was obtained that the rapid leaf abscission was due to inactivation of indole acetic acid by *M. citricolor*, possibly by means of an

oxidizing enzyme which may be actively secreted or released by autolysis. It is postulated that the severe pathogenic activity of *M. citricolor* is due to this auxin-inactivating enzyme.

Activité de l'I.R.C.T. Année 1952. [The work of the I.R.C.T. Year 1952.]—*Cot. et Fibr. trop.*, 8, 1, pp. 3–148, 45 figs., 2 graphs, 1953.

The following are among the items of phytopathological interest in this report of the Institut de Recherches du Coton et des Textiles Exotiques [cf. *R.A.M.*, 32, p. 185]. At Bambari Station, French Equatorial Africa, of various products tested for cotton seed disinfection against *Rhizoctonia* [*Corticium*] *solani*, *Colletotrichum* [*Glomerella*] *gossypii*, *Xanthomonas malvacearum*, and storage moulds [unspecified] the best results were given by granopera [loc. cit.] and 2 per cent. granosan [loc. cit.] both at 0·5 per cent. by weight. At Bébedjia, where granopera was not tested, sanigran gave the best emergence and yields. At Bossangoa only granopera gave emergence significantly better than the untreated.

When treated and untreated seed of 60 per cent. germinative capacity was stored from the end of January until the end of June in a heap (instead of in sacks, as is done at commercial centres after delinting) thiograine (50 per cent. thiram) displayed good preservative properties, giving 55 per cent. germination, compared with 26 for the untreated and 56 per cent. for seed in sacks. In the field thiograine and granopera gave by far the best yields, and they conferred almost perfect preservation on seed stored in heaps or sacks.

In tests of varietal resistance to *X. malvacearum* Allen 51–296 cotton was highly resistant to leaf infection; varieties that developed a very low percentage of leaf infection were NT 205/43, Fogri C 12, Allen 49 T, and Allen 50 T. Infections of the fruiting branches gave closely comparable results to leaf infections. Boll reaction, however, to direct infection or to secondary spread from the contaminated branch appeared to be the opposite of leaf or branch reaction; under the experimental conditions boll resistance did not appear to depend on the same factors as leaf resistance.

Fusarium vasinfectum is still present at Uango [loc. cit.], but at Bangassou [loc. cit.] it has not reappeared since 1950. In varietal resistance tests the following were resistant: Soumbé G 03, the Allen selections 50 T, 51–296, and 49 T, Arkansas 17–1606–4, and GAR 33–1447. The following were very tolerant or tolerant: Stoneville massal (control), the Stoneville selections 2 B, 2–180, and massal 1439, BAR 32–1453, GAR 32–1031–67, GAR 32–1035–84, Soumbé 105, Samaru 26 C 50, Coker 100 wilt, Arkansas 17–5–2, Deltapine, BAR 10/2, Triumph D3E1G1, and Banda × Arkansas 17.

In seven different localities in Tchad every cotton variety grown was affected by a disease which killed the plants in circular areas 5 to 10 m. in diameter. The cotton was attacked at any age and the development of the disease was very rapid. In most cases no causal organism could be isolated; in some, symptoms of *Macrophomina phaseoli* were observed.

At Tikem Station cotton seed treated with verisan [31, p. 532] and dow 9 B gave 79·3 and 76·5 per cent. emergence, respectively, as against 63·6 per cent. for the untreated.

Epps (J. M.), Raskopf (B. D.), & Andes (J. O.). **Cotton wilt damage in Tennessee.** —*Plant Dis. Reptr*, 38, 4, pp. 304–308, 1954. [Multilithed.]

A survey was carried out from 1951 to 1953, inclusive, to determine the damage caused by cotton wilt (*Fusarium* [*vasinfectum*] and *Verticillium* [*albo-atrum*: see next abstract]) in 19 cotton-growing counties of western Tennessee, to establish more reliable criteria of wilt loss estimates, and to intensify experiments on disease

control. Of every 100 acres inspected averages of 11 to 50 were infected by *Fusarium*, the incidence varying considerably from year to year, and 5 to 11 by *Verticillium*. The average annual loss was estimated at 9,209 bales (valued at $1,197,000), 62 per cent. of which was due to *Fusarium* and 38 per cent. to *Verticillium*. Significant losses occurred in the Delta counties Lauderdale, Tipton, Shelby, Lake, and Dyer and in the upland cotton-producing counties Crockett, McNairy, Gibson, Madison, and Fayette, while in other counties occasional individual farms were heavily infected.

Christensen (P. D.), Stith (L. S.), & Lyerly (P. J.). **The occurrence of Verticillium wilt in Cotton as influenced by the level of salt in the soil.**—*Plant Dis. Reptr*, 38, 4, pp. 309–310, 1954. [Multilithed.]

In a study at El Paso Valley Experiment Station, Ysleta, Texas, of soil samples taken from different areas of cotton fields where the amount of wilt (*Verticillium albo-atrum*) [*R.A.M.*, 33, p. 422] varied widely it was found that the severity of the disease varied inversely with the salt concentration in the soil and sodium in the leaves.

Babayan (A.). Короткоузлие — новый вид заболевания Хлопочатника. [Short nodes—a new kind of Cotton disease.]—Хлопководство [*Cotton Raising*], 4, 6, pp. 57–60, 4 figs., 1954.

A description is given of a hitherto unknown disease observed for the first time in September, 1952, on cotton at the Armenian Scientific Research Institute of Technical Crops, U.S.S.R. There is no yield and the seeds are hollow. All the cotton varieties grown in Armenia are affected, both dwarf varieties and well-developed large ones. The disease is characterized by very short internodes and crimping, glossiness, and thickening of the leaf blades. Dwarf forms, in addition, have small leaves and produce only one or two undersized bolls or none. The flowers of larger plants are relatively smaller and bolls, sometimes densely crowded, considerably smaller than healthy ones. As a rule, the raw cotton in these bolls does not become flocculose when the plant matures and cannot be collected. At the end of the growth period individual diseased leaves lose their green colour completely, the affected plants becoming clearly distinguishable from a distance by the red colour of the leaves. Sometimes in larger plants only the top and middle leaves become affected while the lower ones remain apparently normal. The lower bolls in such plants are large and the cotton becomes slightly downy. *Verticillium* [*dahliae*: *R.A.M.*, 33, p. 352] symptoms are sometimes observed simultaneously with the short-nodes. Experiments have shown, however, that the latter disease is not caused by a fungus and is not due to any nutritional or physiological disorders. It is not seed-transmitted. The anatomical structure of the diseased leaves is very reminiscent of that produced by virus leaf roll. Although not proved experimentally, the disease is believed to be of virus origin of the yellows type and to be insect-transmitted. Spring-sown cotton was more susceptible (4·1 per cent. infection) than the summer-sown (1·1 per cent.). In preliminary varietal resistance trials the variety AO = 6 of *Gossypium barbadense* was resistant.

The disease was not observed in 1953.

Mirzabekyan (R. O.) & Karapetyan (N. A.). Влияние антагонистов и их антибиотических веществ на возбудителя гоммоза Хлопочатника. [The influence of antagonists and their antibiotic substances on the causal agent of Cotton gummosis.]—Агробиология [*Agrobiology, Moscow*], *1953*, 6, pp. 55–62, 1 fig., 1953.

Most of this information on the field and laboratory use of various antibiotics, Nos. 15 and 15 (n) in particular, against cotton gummosis (*Pseudomonas*

[*Xanthomonas*] *malvacearum*) [*R.A.M.*, 32, p. 636] has already been noticed from another source [31, p. 621].

Davis (H. C.), Loosanoff (V. L.), Weston (W. H.), & Martin (C.). **A fungus disease in Clam and Oyster larvae.**—*Science*, 120, 3105, pp. 36–38, 1 fig., 1954.

In studies at the United States Fish and Wildlife Service, Milford, Connecticut, and the Biological Laboratories, Harvard University, Cambridge, Massachusetts, many dead and dying larvae in cultures of clam (*Venus mercenaria*), American oyster (*Crassostrea virginica*), *V. mortoni*, and hybrids of *V. mortoni* female crossed with *V. mercenaria* male and the reciprocal cross were infected by a fungus [cf. *R.A.M.*, 30, p. 106]. Its presence in the cultures appears to be endemic. As a rule, there are only a few infected larvae and only in rare instances does the disease reach epidemic proportions, killing almost the whole population in two to four days. Even in cultures in which mortality is very severe, there are some larvae which live through the epidemic without becoming affected.

The fungus is transmitted by biflagellate zoospores which emerge through the tip of an exit tube put out by the sporangium through the surface of the infected larva [cf. 22, p. 137]. Larvae of all ages and individuals already metamorphosed into juvenile clams are parasitized. Within the animal the fungus develops as a contorted, looped, sparsely branched, torulose thallus with constrictions at intervals between the swollen, often lobed segments, sometimes occupying only a relatively small part of the shell cavity but often filling a large proportion. As the fungus rapidly develops, the segments mature into sporangia, each with an exit tube.

While the identity of the fungi concerned has not yet been specifically determined, all their critical distinctive features affiliate them most closely with *Sirolpidium*, though the two species of this genus so far recognized have been reported only on marine algae.

Loegering (W. R.). **Marasmius stenophyllus on Abaca (Musa textilis) in Central America.**—Abs. in *Phytopathology*, 43, 9, p. 479, 1953.

Marasmius stenophyllus, the agent of sheath rot of *Musa textilis* [*R.A.M.*, 32, p. 367], is co-extensive with the cultivation of the crop in Central America. All the common varieties are more or less susceptible but other *M.* spp. are not so severely damaged, while *Heliconia* spp., also in the Musaceae, are highly resistant. Fructifications of the fungus are commonly found on badly decayed plants but the disease is spread mainly by contact between infected and healthy plants, though spores may occasionally contribute to its dissemination. Early harvesting on strictly sanitary lines is recommended as a means of control.

Cumber (R. A.). **Studies on Oliarius atkinsoni Myers (Hemiptera : cixiidae), vector of the 'yellow-leaf' disease of Phormium tenax Forst. IV.—Disease-vector relationships.**—*N.Z.J. Sci. Tech.*, Sect. B, 35, 6, pp. 536–549, 2 pl., 1954.

In further work in this series [cf. *R.A.M.*, 33, p. 229] experiments were conducted at the Entomological Research Station, Foxton, New Zealand. The results indicate that the *Phormium tenax* yellow leaf disease [33, p. 353] is probably induced by nymphal feeding by *Oliarius atkinsoni*. No evidence was obtained of adult bugs from healthy plants becoming infective after leaf feeding on diseased plants. Many of the test plants died from a sudden die-back condition [loc. cit.]. As transmission percentages with adults varied with different caging techniques, a better method and long test-feeding periods are recommended for future experiments, as well as a further examination of a possible fungal attack in the etiology of the disease.

Beaumont (A.). **Diseases of Rhododendron.**—*Gdnrs' Chron.*, Ser. 3, 136, 3522, p. 15, 1954.

Notes are given on diseases of rhododendron in Great Britain. Root rot (*Armillaria mellea*) [*R.A.M.*, 17, p. 823] is widely distributed but kills only isolated trees. Similarly, butt rot (*Fomes annosus*) [6, p. 763] and silver leaf (*Stereum purpureum*) [4, p. 481] which induces no silvering of the leaves, both kill isolated trees but are much less common. Gall (*Exobasidium vaccinii*) [cf. 26, p. 129] producing reddish swellings on the leaves, though common on azaleas [*Rhododendron*: 33, p. 425], is rare on rhododendrons though it has been reported on *R. ferrugineum*, *R. hirsutum*, and *R. wilsonae*. Picking off diseased leaves is effective. Leaf spots, controlled by Bordeaux mixture sprays, include *Gloeosporium rhododendri* [cf. 23, p. 440] and *Septoria rhododendri*, which has been reported on *R. ponticum*.

Treggi (G.) & Faldi (G.). **Sopra una alterazione dei bulbi di Gladiolo.** [A disorder of Gladiolus corms.]—*Agricoltura ital.*, 52 (N.S. 7), pp. 102–106, 3 figs., 1952.

On several occasions the Plant Pathology Institute, University of Pisa, has received gladiolus corms of the varieties Nuova Europa, Picardy, and Lavandel Orean of foreign origin, bearing on the outer scales brownish, zonate, suberous, slightly depressed spots covered by a growth of *Penicillium brevi-compactum* [cf. *R.A.M.*, 31, p. 621]. The mould is believed to have developed in storage, as all the corms were healthy when imported.

In a field experiment 250,000 corms of diverse quality treated with sesan at 200 gm. per q. sustained no losses, while some neighbouring untreated plantings showed marked failure. As the disease appears to be capable of causing serious losses the following control measures are suggested: removing adhering soil from home-grown corms; treating them, whether home-grown or imported, with 200 to 400 gm. fungicide before storage, depending on the size and number of corms; storing in a dry, aerated place, preferably disinfected beforehand; and repeating the fungicidal treatment in spring before planting.

Murakishi (H. H.). **Spathoglottis, a good indicator plant for Orchid viruses.**—*Bull. Pacif. Orchid Soc. Hawaii*, 12, 1, pp. 20–22, 1954.

In studies at the University of Hawaii Agricultural Experiment Station, Honolulu, Vanda mosaic virus [*R.A.M.*, 31, p. 607], Honohono orchid [*Dendrobium superbum*] mosaic virus [32, p. 130], *Cattleya* leaf necrosis (*Phytopathology*, 42, p. 517, 1952), and other mosaics, colour breaks [*R.A.M.*, 31, p. 17], and ring spots affecting eight different orchid genera growing in different orchid nurseries in Honolulu were tested on healthy *Spathoglottis* seedlings. Most of the test plants which showed infection developed symptoms closely reminiscent of *Spathoglottis* diamond-spot virus [31, p. 329]. Diamond- to ring-shaped necrotic spots appeared on the inoculated leaves after four to six weeks. Certain isolates of *Spathoglottis* diamond spot, *Cattleya* leaf necrosis, Honohono orchid mosaic, and *Cattleya* colour-break viruses caused leaf base necrosis. Severe necrotic symptoms were more in evidence on rapidly growing, young test plants than on the slower growing, old ones. Systemic, concentric ring spots appeared later on leaves formed after inoculation and persisted for one to two years. *Cattleya* leaf necrosis and *Cymbidium* viruses can also be transmitted from *Spathoglottis* back to the respective hosts, indicating that *Spathoglottis* can serve as a carrier of orchid viruses and should, therefore, be removed from inside and around orchid houses.

Vasudeva (R. S.), Joshi (L. M.), & Lele (V. C.). **Susceptibility of some grasses to cereal rusts.**—*Indian Phytopath.*, 6 (*1953*), 1, pp. 39–46, 1954.

Some of this work at the Division of Mycology and Plant Pathology, Indian

Agricultural Research Institute, New Delhi, on the reactions of various grasses, chiefly exotic species, to various races of black, yellow, and brown rusts of wheat (*Puccinia graminis tritici*, *P. glumarum*, and *P. triticina*) and oat black rust (*P. graminis avenae*) has been reported from other sources [*R.A.M.*, 32, p. 545; 33, p. 78]. In inoculation experiments *Agropyron pauciflorum*, *Aegilops triuncialis*, *Bromus japonicus*, and *Avena fatua* were heavily or moderately infected by *P.g. tritici*, *Aegilops triuncialis* and *Hordeum distichum* moderately infected by *P. triticina*, and *Agropyron elongatum*, *A. obtusiusculum*, *A. scabrum*, *A. sibiricum*, *A. desertorum*, *A. pauciflorum*, *Aegilops triuncialis*, *H. stenostachys*, *B. catharticus*, and *B. japonicus* heavily infected by *P. glumarum*. *Phalaris paradoxa*, *P. platensis*, *Avena fatua*, *A. strigosa*, *B. mollis*, and *B. japonicus* were heavily or moderately infected by *Puccinia graminis avenae*.

B. catharticus, *B. japonicus*, and *H. murinum* bore natural infections of *P. glumarum*.

Rescuegrass seed treatment.—*Seed World*, 74, 8, p. 25, 1954.

In recent seed treatment trials conducted by a commercial laboratory ceresan M (4 oz. per 100 lb. seed) gave effective control of smut [*Ustilago striiformis* and *U. bullata*: *R.A.M.*, 33, p. 359] on rescue grass [*Bromus catharticus*], which is susceptible in the south [of the United States]. Because rescue grass seed is hulled, it should be stored for at least two days after treatment before sowing to ensure proper disinfection.

Graniti (A.). **Rilievi sulle alterazioni e sui danni causati da Scolecotrichum graminis Fuck. a Dactylis glomerata L.** [Observations on the changes and injuries caused by *Scolecotrichum graminis* Fuck. in *Dactylis glomerata* L.]—*Nuovo G. bot. ital.*, N.S., 60, 3, pp. 565–578, 12 figs., 2 graphs, 1953. [English summary].

Studies carried out at the Laboratory of Plant Pathology of the Agricultural Institute of Italian Africa, Florence, Italy, and at the Institute of Plant Pathology, Sassari, showed that when leaves of *Dactylis glomerata* are infected by *Scolecotrichum graminis* [cf. *R.A.M.*, 26, p. 493; 31, p. 331, *et passim*] the tissues surrounding the point of infection thicken slightly, owing to swelling of the mesophyll cells, with a simultaneous reduction in size of the intercellular spaces. Then there is a gradual reduction in the thickness of the leaf in the infected area, the mesophyll cells becoming reduced in volume. A central cavity forms, which often contains hyphae. Hyphae are also present in the phloem of the bundles. In some substomatal cavities the mycelium forms a stroma which crushes the cells of the surrounding tissue, gives rise to conidiophores, and finally ruptures the stoma. The central cavity enlarges at the expense of the mesophyll cells, and the greatly reduced thickness of the leaf is varied only by swellings where the smaller fibrovascular bundles are present.

Chemical analysis demonstrated that in a crop with 44 per cent. infection there was an over-all loss of nutritive value of approximately 25·22 per cent.

Lithgow (A. V.) & Cottier (K.). **Pre-harvest examination of Ryegrass seed for blind seed disease.**—*N.Z.J. Agric.*, 87, 5, pp. 405–406, 2 figs., 1953.

Directions are given for collecting seed samples for the pre-harvest testing of rye grass [*Lolium perenne*] for blind seed disease [*Phialea temulenta*: *R.A.M.*, 32, p. 317] in New Zealand. To obtain an accurate indication of the final germination, testing should be done not earlier than a week before cutting. If infection is present a further sample should be taken later. A review is given of research carried out at the Department of Agriculture, Wellington. Surveys conducted

over three seasons (1948–51) have shown that in areas producing seed of high germinative capacity the number of rainy days during flowering was half that where low-germination crops are grown (South Otago and Southland). Increase of grass in the crop increased germination of harvested seed, and high yielding crops gave better germination. Cultural methods designed to take advantage of these facts should minimize the disease.

Sprague (R.). **Some leafspot fungi on western Gramineae. VII.**—*Mycologia*, 46, 1, pp. 76–88, 1 fig., 1954.

In this further contribution to the present series [*R.A.M.*, 30, p. 472; cf. 32, p. 680; 33, p. 86] notes are given on new and noteworthy fungi causing leaf spots on Gramineae, collected in south-eastern Alaska in July and August, 1952. Included are two new species and one new form, as well as *Septoria avenae* [*Leptosphaeria avenaria*] on *Agrostis borealis*, *S. jaculella* [25, p. 346] on a new host, *Bromus sitchensis*, *S. tenella* (a new record for Alaska) [cf. 31, p. 331] on *Festuca* spp., and *S. macropoda*, *S. oudemansii*, *Darluca filum* (common locally) [cf. 29, p. 336; 30, p. 491], *Puccinia poae-sudeticae*, *Selenophoma donacis* var. *stomaticola* [cf. 33, p. 87], *Helminthosporium vagans* (an important parasite locally) [cf. 32, p. 629 and next abstract], and *Cercosporella poagena* (not before reported outside Oregon) [31, p. 331], all on *Poa* spp.

Howard (F. L.). **Bluegrass 'going-out' control with phenyl mercurials.**—Abs. in *Phytopathology*, 43, 9, p. 476, 1953.

The serious blight of *Poa pratensis* caused by *Helminthosporium vagans* in New England [cf. *R.A.M.*, 33, p. 504 and preceding abstract] may result in the failure of over 90 per cent. of the turf in a single season. The Merion variety sustains only slight damage from the leaf spot phase, whereas Kentucky, Delta, *P. trivialis*, and *P. compressa* are attacked by a lethal crown necrosis or foot rot. A comparison of fungicides on plots of Kentucky and Merion [at Rhode Island Agricultural Experiment Station] demonstrated the outstanding efficiency of phenyl mercury compounds applied as sprays at the rate of 1·6 oz. of 10 per cent. active in 5 gals. water per 1,000 sq. ft. Plots containing more than 50 per cent. of diseased plants on 1st April showed under 5 per cent. infection on the 29th following treatments on the 1st and 14th, while in untreated plots there was a concurrent increase to more than 90 per cent.

Seethalakshmi (V.). **Blight of Cyperus rotundus and C. bulbosus Vahl.**—*Indian Phytopath.*, 6 (*1953*), 1, pp. 57–62, 2 pl., 1954.

Notes are given on two blights of *Cyperus* common in the vicinity of Coimbatore, India, during the rainy season in October and November, characterized by brown, water-soaked lesions on the leaf blade and leaf sheath and killing of the aerial shoots. *Phytophthora cyperi-rotundati* [*R.A.M.*, 7, p. 273] caused blight on *C. rotundus* and occasionally on *C. bulbosus*, while *P. cyperi-bulbosi* was confined to *C. bulbosus* [33, p. 31].

Bellue (Margaret K.). **Ergot on pasture grasses in relation to convulsive ergotism in livestock.**—*Bull. Dep. Agric. Calif.*, 43, 1, pp. 9–11, 2 figs., 1954.

An outbreak of nervous disorder of cattle in the upper San Joaquin Valley in 1953 was found to be due to ergots of *Claviceps purpurea* infecting rye grass [*Lolium* spp.] and of *C. paspali* on Dallis grass [*Paspalum dilatatum*: *R.A.M.*, 33, p. 539]. To prevent infection it is recommended that grass should be mown or grazed before the ears develop.

Davies (E. B.) & Grigg (J. L.). **Molybdenum and its use in grassland production.**—*N.Z.J. Agric.*, 87, 6, pp. 561, 563, 565, 567, 5 figs., 2 graphs, 1 map, 1953.

Further investigations on molybdenum deficiency in pastures and lucerne crops in New Zealand [*R.A.M.*, 33, p. 114] have enabled the areas of proven deficiency to be extended to boundaries based on soil survey data. Responses obtained in trials with molybdenum on various soil types are briefly described. The use of molybdenum and methods of application are discussed. The element should not be applied more frequently than every second or even third year to avoid possible undesirable effects through accumulation. A map is supplied showing the sites throughout the country of molybdenum trials, mainly of the observational top-dressing type, with positive and negative responses differentiated.

Halpin (J. E.) & Hanson (E. W.). **Relative pathogenicity of seven species of Pythium on Alfalfa and Sweetclover seedlings.**—Abs. in *Phytopathology*, 43, 9, p. 474, 1953.

In further replicated greenhouse trials with seven species of *Pythium* at Wisconsin Agricultural Experiment Station [*R.A.M.*, 32, p. 22] *P. debaryanum*, *P. ultimum*, *P. irregulare*, and *P. splendens* were highly pathogenic throughout the temperature range of 16° to 28° C. to both sweet clover [*Melilotus* sp.] and lucerne, killing all seedlings before emergence. *P. paroecandrum* destroyed most of the seedlings at the same stage and severely damaged such plants as did emerge. *P. arrhenomanes* was only slightly pathogenic and *P. rostratum* innocuous. Both hosts were about equally susceptible—more so than red clover [loc. cit.]—to all the species except the last two.

Weber (G.). **Die Bekämpfung des Apfelschorfes (Venturia inaequalis) mit einer Fermat-Nebellösung.** [The control of Apple scab (*Venturia inaequalis*) with a fermate mist solution.] —*Z. PflKrankh.*, 60, 8, pp. 408–409, 1953.

In connexion with a project of the Plant Protection Station, Frankfurt-am-Main, Germany, for the control by means of a single treatment of both apple scab (*Venturia inaequalis*) [*R.A.M.*, 33, p. 15] and *Carpocapsa pomonella*, ten-year-old espaliers of three varieties were sprayed once (at the end of May) with a mixed solution of fermate and DDT, applied by means of a mist applicator, manufactured by Gebr. Borchers A.G., Goslar, at the rate of 12 l. per 50 trees. At harvest time the percentages of scab-free Berlepsch, Landsberger Renette, and Laxton's Superb fruits on the treated trees were 68·6, 75·4, and 68·8, respectively, compared with 7·2, 12·5, and 6·5, respectively, on the untreated, the corresponding figures for severe fruit infection being 1·1, 3·5, and 3·1 per cent. on the sprayed and 27·8, 38·8, and 29 per cent. on the unsprayed.

Kuć (J.), Henze (R. E.), & Quackenbush (F. W.). **Apple scald, production and control in the laboratory.**—*Agric. food Chem.*, 1, 18, pp. 1104–1107, 1 fig., 1 graph, 1953. [Received 1954.]

In experiments at Purdue University, Lafayette, Indiana, volatile products from stored apples were collected on activated carbon and extracted with ether, and these extracts were shown to produce symptoms indistinguishable from apple scald [*R.A.M.*, 33, p. 488] as it occurs in commercial warehouses. The most active scald-inducing constituents [32, p. 680] were the esters, which produced severe injury in 12 hours, then short-chain alcohols. Synthetic esters and alcohols induced similar injury but much more rapidly. An aqueous alkaline solution of potassium permanganate (10 per cent. in 10 per cent. sodium or potassium hydroxide) was the most promising substance in laboratory tests for removing

injurious substances from the circulating air during storage of apple varieties susceptible to scald.

Messiaen (C. M.) & Lafon (R.). **Études sur le black-rot du Pommier (Sphaeropsis malorum Peck).** [Studies on black rot of Apple (*Sphaeropsis malorum* Peck).] —*Rev. Path. vég.*, 32, 3, pp. 133–142, 7 figs., 1953.

Pycnidial formation in strains of *Physalospora obtusa* [*R.A.M.*, 27, p. 425] collected from apple trees in south-western France was increased considerably by covering the surface of young colonies on agar plates with sheets of paper. Heavily sporing colonies were secured by a dilution method and one of these gave rise to a strain which sporulated freely on the usual media and, contrary to previous experience, continued to do so for 18 months.

Inoculations of wounded branches of Reinette de Caux scions showed that strain I was highly virulent, infection progressing several mm. per day. On vigorous shoots of Reinette du Canada at Grande-Ferrade this strain produced moderate-sized cankers. The spread in two months of strains I to VI in apple branches was, respectively, 20, 0, 5, 2, 0·5, and 0 cm. On apple fruits prick inoculations with strain I produced slow mummification with no pycnidial development; the other strains rapidly induced black rot symptoms and fructified profusely.

The spraying of unwounded leaves of Doucin seedlings with strain VII caused infection at 23° C. in saturated conditions; the incubation period was nine days.

It is concluded that the strains of *P. obtusa* found in south-western France are capable of causing appreciable damage to apple leaves and fruits, but, with the exception of strain I, are not very virulent to healthy, vigorous branches. As pycnidia are not commonly found on the leaves and appear on the fruits only towards the end of the season, the source of infection is probably from dead branches, pruning residues, and mummified fruits; perithecia may also cause infection.

Control by improved orchard hygiene and careful storage of fruit is recommended.

McIntosh (D. L.) & Mellor (F. C.). **Crown rot of fruit trees in British Columbia. II. Rootstock and scion resistance trials of Apple, Pear, and stone fruits.**— *Canad. J. agric. Sci.* (formerly *Sci. Agric.*), 33, 6, pp. 615–619, 1953.

In further studies at Summerland, British Columbia [cf. *R.A.M.*, 24, p. 64; 33, p. 139], a mixed inoculum of four isolates of *Phytophthora cactorum* from apple [33, p. 359] gave disease ratings (100 representing minimum and 0 maximum resistance) of 0 to 40 for apple, 1 to 85 for pear, 3 for plum, 19 for apricot, 28 to 29 for peach, and 3 to 62 for cherry [33, p. 240]. Bedford, Antonovka, and Columbia apple seedlings, Malling IX and Malling VII apple stocks, and Delicious, Jubilee, Spartan, and Winesap on their own roots showed considerable resistance. Of the pears the stocks Old Home and French seedling were resistant. Reinoculation of Mazzard cherry F12/1 clonal stocks and *Pyrus robusta* seedlings with the inoculum containing an additional isolate from sweet cherry resulted in marked increase in susceptibility, but seedlings of Bartlett pear and Mahaleb cherry retained their resistance.

Research work and workers.—*Seed World*, 74, 8, p. 16, 1954.

A bentonite dust incorporating crude streptomycin has given good control, comparable to copper materials but without russeting, of pear fire blight [*Erwinia amylovora*: *R.A.M.*, 33, p. 157] in California.

Gayford (G. W.). **Rootstocks for deciduous fruit trees.**—*J. Dep. Agric. Vict.*, 52, 6, pp. 255–258, 4 figs., 1954.

Black end of pears in Victoria [*R.A.M.*, 33, p. 432] is confined to trees or stocks with an oriental pear in their parentage and does not occur on the fruit of trees budded on French seedlings. The northern Californian black walnut (*Juglans hindsii*) raised from seed, is the best rootstock for walnut; it is resistant to *Armillaria* [*mellea*: cf. 31, p. 463], but is believed to be susceptible to crown rot [*Phytophthora* sp.: 13, p. 336].

Wagnon (H. K.) & Breece (J. R.). **Necrotic leaf spot of Peach and its effects on June-budded nursery stock.**—*Bull. Dep. Agric. Calif.*, 43, 1, pp. 13–17, 1 fig., 1954.

Peach necrotic leaf spot [cf. *R.A.M.*, 28, p. 441], a mild virus disease, was first observed in Michigan by Cation (abs. in *Phytopathology*, 32, p. 2, 1942) on Elberta and Carman peach trees after budding from sweet cherry. The disease was detected in the same way by Dr. L. C. Cochran in California and has since been observed on 84 peach and nectarine varieties in the two localities. Several sweet cherry varieties, a sour cherry, and probably also almond are symptomless carriers. The symptoms are readily mistaken for those of ring spot virus. Brown, sometimes purple areas, which may be preceded by chlorotic spots, appear on young unfolding leaves or, sometimes, after expansion. These necrotic spots are round or irregular and finally drop out, leaving a clean-edged margin. The necrotic areas may coalesce; such severely affected leaves disintegrate and may drop prematurely. These symptoms develop on leaves unfolding in high temperatures during midsummer, and may appear year after year, whereas ring spot usually occurs on leaves developing early in the growing season and becomes latent later. The spots of shot hole (*Coryneum beijerincki*) [*Cladosporium carpophilum*] are different in having a yellow centre which later turns brown. Shot hole infection is also dependent on rainfall, as the spores need at least 24 hours' moisture on the leaves, and is uncommon on June-budded nursery trees where necrotic spot is common.

Necrotic leaf spot is transmitted by budding and grafting; there is no evidence of natural spread in nursery or orchard and it seems to have little effect on mature trees. It causes dwarfing of the newer budded saplings and may be controlled by the use of healthy grafting sources; caution is necessary when budding or grafting new varieties on to established trees.

Junker (H.). **Zur Bekämpfung der Blattüpfelkrankheit an Kirschenwildlingen.** [On the control of the leaf pit disease of wild Cherry.]—*Pflanzenschutz*, 6, 1, pp. 8–10, 1 fig., 1 graph, 1954.

Since 1949 bird cherries in a nursery near Munich, Germany, where they are raised on a large scale, have sustained increasingly heavy damage from *Cylindrosporium padi* [*Coccomyces hiemalis*: *R.A.M.*, 33, p. 206 and above, p. 588]. In 1953 spraying experiments were carried out to determine the relative efficiency against the pathogen of a mercurial, 0·2 per cent. hora Fc 51 (Fahlberg-List A.G., Wolfenbüttel), 0·3 per cent. cupravit (Ob21) [33, p. 48], and 0·3 per cent. cuprarot spray (45 to 50 per cent. copper oxide, Pflanzenschutz, Spiess).

Hora Fc 51 gave the best control, even a single treatment on 11th July reducing the number of severely and moderately infected trees from 72 to 1 and 28 to 21 per cent., respectively. None of the trees sprayed twice (29th May and 11th July) contracted severe infection and only nine out of 100 showed medium-heavy damage. Cupravit, though somewhat injurious, was also reasonably effective, especially where three treatments were applied, beginning on 4th April. With the full schedule it should be practicable to defer the first application until the middle of May and

spray twice more at three- to four-weekly intervals. Cuprarot spray caused leaf damage and its use against *C. hiemalis* cannot be recommended.

Posnette (A. F.). **Virus diseases of Cherry trees in England. I. Survey of diseases present.**—*J. hort. Sci.*, 29, 1, pp. 44–58, 3 pl., 1954.

In further work on the virus diseases in 50 cherry orchards in Kent, Herefordshire, and Worcestershire in 1950 and 1951 [*R.A.M.*, 31, p. 171; 33, p. 68] it was found that the symptoms fell into six groups. The rosette type [31, p. 558], which agrees fairly closely with mottle leaf in western North America but differs in causing pronounced stunting and necrotic spotting on sour cherry seedlings, was found in the Schrecken variety, the leaves of which were harsh, narrow, and crinkled on either side of the midrib, with vein clearing developing later into a mottle. Growth of young Schrecken trees was greatly retarded, but the degree of stunting varied from year to year and was more conspicuous on early than on late growth. In many instances symptoms on orchard trees were confined to a few branches in one year and did not appear in the next. When the 1946–51 yields of the trees on which symptoms were detected in 1951 were compared with those of symptomless trees a reduction in total yield of 32·4 lb. was noted.

Viruses in the rasp leaf group [loc. cit.] appear to be the same as those in North America [21, p. 378]; they also cause rosetting and harsh leaves in addition to the characteristic conspicuous enations of this disease. There are considerable varietal differences in the development of these enations, and the possibility of virus-strain differences is being investigated. No enations have been observed on Early Rivers, which can behave as a symptomless carrier. The condition has a severe stunting effect on many commercial varieties, and most of the affected orchard trees seen were commercially useless. The virus was transmitted from Frogmore to Bing with full symptom development; large enations also appeared on Morello seedlings after inoculation, but few F 12/1 plants developed enations and these were inconspicuous.

Three diseases can be distinguished in the tatter leaf group [33, p. 68]: (*a*) necrosis affecting chiefly the leaves formed in spring (i.e., spur leaves and basal leaves on the extension growth), or (*b*) those formed in summer (i.e., the youngest leaves on the extension growth), or (*c*) both old and young leaves. In (*b*) and (*c*) the necrosis in the young leaves frequently coincides with a line pattern; (*c*) may be caused by dual infection with the (*a*) and (*b*) viruses. Observations suggest that different tatter leaf viruses are distinguishable also by the sequence of symptoms over several years, symptoms recurring each year on some trees, whereas others suffer a shock effect one year and later remain almost symptomless. Trees with the acute form appeared to bear fewer fruits than symptomless trees, while those known to have been infected for several years and showing only the milder, chronic form produced a fair crop. The first transmissions of tatter leaf virus were made from an Early Rivers tree with the (*a*) type of symptoms and from an adjacent symptomless Kentish Red sour cherry. Both types of inoculum caused severe necrosis on F 12/1 in the following year, and when returned to Early Rivers both caused tatter leaf. Indexing on peach and sour cherry demonstrated, however, that the viruses were not identical, the Kentish Red tree probably having both tatter leaf and an additional virus, possibly necrotic ring spot.

The chlorotic mottles group [31, p. 171] can be divided into ring mottles [33, p. 159], veinbanding, and water-mark (oak-leaf) patterns, but no clear distinction between the types has yet emerged from transmission studies. Mottle symptoms were seen on many orchard trees, but latent infection was also common. On mature trees mottle was often confined to a few shaded leaves and did not appear every year.

Symptoms of rusty mottle [33, p. 69] take the form of yellow spots, consisting

of clusters of yellow veinlets, which appear in July and gradually increase in intensity throughout August and September. Varying amounts of rusty red pigment (according to the virus strain present) may appear, usually over the spots. Some strains have a weakening effect on certain varieties.

Symptoms of sour cherry yellows [cf. 32, p. 135; 33, p. 159] (fall in June of yellow leaves with green bands along the midrib and the main veins) were noted on many sour cherry trees scattered throughout sweet cherry orchards. Transmission to Montmorency cherry confirmed the presence of the sour cherry yellows complex [28, p. 20].

In the course of the transmission studies some latent viruses were brought to light, namely several strains of necrotic ring spot [33, p. 68], dusty yellows, sunken mottle with dark green vein banding, and a virus canker.

Fisher (Eileen E.) & Jenkins (P. T.). **Spray trials for control of Apricot 'freckle'.** —*J. Dep. Agric. Vict.*, 52, 6, pp. 265–267, 270, 2 figs., 1954.

Severe losses from apricot 'freckle' (*Cladosporium carpophilum*) are experienced in southern Victoria [*R.A.M.*, 33, p. 32], the percentages of freckled fruit on untreated trees in the spraying trials held from 1950 to 1953 being 70, 58, and 78 respectively. As a result of these tests it appears that freckle may be controlled by the application of 6–6–40 Bordeaux mixture at the pink-bud stage followed by 0·12 per cent. thiram or ziram plus one per cent. white oil at sepal fall and again seven or eight weeks later. Two cover sprays were more effective than one, ziram giving 1·8 per cent. and 8·5 per cent. freckled fruit, respectively, the corresponding figures for thiram being 3 and 12 per cent. Captan caused severe fruit and foliage injury.

Streaky yellows in Strawberry Auchincruive Climax.—*Gdnrs' Chron.*, Ser. 3, 136, 3525, p. 43, 1954.

It is stated that as the result of the increasing prevalence of streaky yellows and the falling vigour of the present stocks of the Auchincruive Climax strawberry [cf. *R.A.M.*, 31, p. 558; 33, p. 96] no further entries of this variety will be accepted under the Strawberry Certification Scheme either for Special Stock or Ordinary Certificates until further notice.

Sturgess (O. W.). **A Strawberry ripe fruit rot.**—*Qd agric. J.*, 78, 5, pp. 269–270, 2 figs., 1954.

In October, 1952, a new disease, due to a species of *Gloeosporium*, caused nearly 50 per cent. wastage of ripe strawberries in some plantings in Queensland. Only fully coloured berries exhibit symptoms, which appear as tan or dark brown, slightly depressed areas. As these enlarge the affected tissues shrivel and pink spore masses appear. Infection starts anywhere on the fruit, often in more than one place. Unless secondary organisms effect an entry the decayed area remains firm, the final process being one of mummification. On affected leaf and flower stalks there are scattered, black, slightly depressed, longitudinal lesions.

The germinating spores are able to penetrate an unbroken fruit surface. If the berry is green the fungus remains dormant until the berry ripens. The optimum temperature requirement of the fungus (75° to 85° F.) restricts the rot to mid-spring and early summer in south-eastern Queensland.

The routine fungicidal applications carried out by some growers against leaf-spot diseases will assist in checking infection; treatment of the runner beds with a copper fungicide in the autumn, if it can be effected without damage by trampling, is recommended. All diseased berries should be removed during routine picking. Unripe berries for processing should be kept at the farm until ripe, so that affected ones may be rejected before transport to the cannery.

Nirvan (R. S.). **Control of Papaya foot rot.**—*Indian Phytopath.*, 6 (*1953*), 1, pp. 47–48, 1 fig., 1954.

The results are presented of a two-year field experiment at the Fruit Research Station, Saharanpur, United Provinces, on the value of 6–6–50 Bordeaux mixture used as a protective spray against papaw foot rot (*Pythium aphanidermatum*) [*R.A.M.*, 31, p. 501], which caused 35 per cent. mortality at Alsibagh and 27 per cent. at Manjulkey during the monsoon season of 1950. A field of 120 $1\frac{1}{2}$-year-old plants in which foot rot incidence had been 35 per cent. the previous year was treated, three times in all at 20-day intervals commencing with the July rains, by removing about two inches of soil from the foot of each plant, spraying the stem and exposed soil, and replacing the latter. An equal number of plants was left untreated. The rot percentages were 6 and 20, respectively, during the first year and 2·5 and 22·5 in the second when only two sprays were given but supplemented by the sticker alboleum, which probably enhanced the protective value of the fungicide. The second-year results appear to be sufficiently good to warrant recommending the method for use by orchardists.

Ruehle (G. D.). **The Sapodilla in Florida.**—*Circ. Fla agric. Exp. Sta.* S-34, 14 pp., 8 figs., 1951.

Sapodilla trees (*Achras zapota*) in Florida are affected by rust (*?Uredo sapotae*) which attacks the leaves particularly in winter and spring. Preliminary experiments indicated that 2 lb. ferbam in 100 gals. water gave control when applied at monthly intervals from October to February. A species of *Septoria* is believed to be responsible for defoliation of sapodilla trees in Palm Beach County and on Matecumbe Key.

Mukoo (H.). **Studies on the causal bacteria of the Loquat canker.**—*Bull. nat. Inst. agric. Sci. Tokyo*, Ser. C, 1, pp. 1–184, 6 pl. (1 col.), 37 graphs, 2 diags., 1952. [Japanese, with English summary, pp. 170–184.]

Bacterial canker of loquat (*Eriobotrya japonica*) occurs all over Japan and is especially severe in wet, humid weather. All parts of the tree above ground are attacked and bear thickened brown lesions. A new bacterium, *Bacillus eriobotryae* Miyake & Mukoo, has been isolated from diseased tissue. *B. eriobotryae*, which differs completely from *Bacterium* [*Pseudomonas*] *eriobotryae* (*J. Pl. Prot., Tokyo*, 18, p. 349, 1931) and *Bacillus amylovorus* [*Erwinia amylovora*: C.M.I. map No. 2] on the same host, is a short, motile rod, 0·6 to 1 by 1·2 to 2·3 μ, Gram-negative, and aerobic, forming white colonies. It produces pectinases which disorganize the host tissue and cause brown cankers to form. The bacterium is killed in 25 minutes in direct sunlight, and by 5 minutes in 0·62 per cent. Bordeaux mixture and 0·14 per cent. copper soap. Agglutination is caused most rapidly by chloride and sulphate, followed by bromide and iodide; trivalent metallic ions are more potent than di-or monovalent. It is concluded that the agglutination of bacteria by metallic ions is brought about by a similar mechanism to the coagulation of immune sera, and seems to depend on electrochemical combination. The minimum temperature for growth was 3° C., the optimum 27° to 28°, the maximum 35°, and the death point 50°. Experiments showed that the bacterium is able to overwinter in soil under most conditions. The parasite also attacks pear but not other rosaceous plants.

Lewis (Y. S.) & Johar (D. S.). **A case of fruit 'rot' caused by yeast.**—*Sci. & Cult.*, 19, 11, p. 559, 1 fig., 1954.

In studies at the Central Food Technological Research Institute, Mysore, India, a yeast (*Hanseniospora velbyensis*) was found to be responsible for a white rotting of green, unripe kamrakh fruits (*Averrhoa carambola*) [cf. *R.A.M.*, 12, p. 379].

Fontes (J. T.) & Da Matta (E. A. F.). **Dois inimigos da cultura da Bananeira na Bahia.** [Two enemies of Banana cultivation in Bahia.]—*Bol. Sec. Agric. Bahia*, 49, 10, pp. 16–20, 5 figs., 1952. [Received July, 1954.]

A brief, popular note is given on the occurrence in Bahia, Brazil, of Panama disease of banana (*Fusarium oxysporum* [f.] *cubense*) [C.M.I. map No. 31], also known as Piracicaba disease. The only practicable control measures are the burning of infected plantings and the cultivation of the resistant Pai Antonio and Congo varieties.

Haller (H. L.) & Simmons (S. W.). **Captan—a coined name for the fungicidal chemical N-trichlormethylthio tetrahydrophthalimide.**—*J. econ. Ent.*, 46, 3, p. 531, 1953.

Captan [*R.A.M.*, 32, p. 685] has been found effective in field experiments for the control of 27 diseases [which are specified]. It has further proved useful as a seed dressing, in the treatment of moulds on paint, plastic, leather, fabrics, and the like, and in the therapy of fungal diseases of man and animals.

Captan is practically insoluble in water, partially soluble in organic solvents, and soluble in chlorinated solvents to the extent of 0·5 per cent. It is compatible with a number of mixtures containing insecticides, ferbam, and phenyl mercuric acetate, and non-injurious to a wide range of plants.

Coloration of seed-treating chemicals studied by NAC.—*Nat. agric. Chem. Ass. News*, 12, 2, p. 6, 1953.

An *ad hoc* committee of the National Agricultural Chemicals Association, convened to consider proposals to colour seed disinfectants [in the United States], report that they would not oppose coloration of treated seed, but they would oppose compulsory coloration. They recommend that all treated seed be tagged. Among the reasons they give are the difficulty of colouring seed by dry materials, the possible effect on toxicity and germination, the lack of knowledge concerning the compatibility of dyestuffs and seed treating chemicals, and possible confusion that might arise if toxic and non-toxic materials were given similar colours.

Horsfall (J. G.) & Rich (S.). **Fungitoxicity of sulfur-bridged compounds.**—*Indian Phytopath.*, 6 (*1953*), 1, pp. 1–14, 1 diag., 1954.

This information has already been noticed from an abridged version [*R.A.M.*, 33, p. 491].

Luettelo virallisesti tarkastetuista kasvinsuojelaineista v. 1953. [A list of plant protectives officially approved in 1953.]—*Valt. Maatalousk. Tiedon.* 230, 36 pp., 1953.

A number of fungicides are included in this list of plant protectives tested at the Plant Protection Station, Tikkurila, Finland, in 1953, with particulars of their several purposes, active ingredients, rates of applications, and sources of supply.

Huysmans (C. P.). **Het onderhoud van motorpoederstuivers.** [The maintenance of motor dusters.]—*Bergcultures*, 22, 15, pp. 300–305, 2 diags., 1953. [English and Indonesian summaries.]

Full directions are given for the maintenance of the motor-dusting equipment used in Indonesia for the application of fungicides.

Neergaard (P.). **Atakoj kontraŭ ĝardenplantoj kaj kiel prilukti ilin.** [Attacks on garden plants and how to control them.]—234 pp., 9 col. pl., 75 figs., The Esperanto Publishing Company, Ltd., Rickmansworth, Herts., 1954. 20*s*.

This is an amplified version, written in Esperanto for international use, of the

author's treatise on the spraying of fruit trees, fruit bushes, kitchen-garden plants, and flowers [*R.A.M.*, 25, p. 407], with additional chapters on the symptomatology and etiology of diseases and pests, conditions favouring their development, and spraying (schedules, standard mixtures, equipment, and precautions). References are given to manuals in English, German, and French and to literature in Esperanto. A glossary of definitions and English equivalents is supplied.

Basio (E.) & Aquino (A.). **Bibliography of the published contributions in agriculture from the College of Agriculture, University of the Philippines, Los Baños, Laguna, from 1909 to 1950.**—iii+403 pp., 1952. [Mimeographed.]

This is a list of the authors and titles of 341 agricultural publications from the College of Agriculture, University of the Philippines. The articles are arranged alphabetically under the author's name, in the appropriate sections, e.g., Plant Industry (pp. 1–163), Agricultural Botany (pp. 164–186), and Plant Pathology (pp. 328–345).

Bugnicourt (F.), Cohic (F.), & Dadant (R.). **Catalogue des parasites animaux et végétaux des plantes cultivées de Nouvelle-Calédonie.** [A catalogue of the animal and plant parasites of the cultivated plants of New Caledonia.]—120 pp., Nouméa, Institut français d'Océanie, 1951.

This is the first of a series of catalogues listing the principal plant and animal parasites of cultivated plants in New Caledonia [cf. *R.A.M.*, 33, p. 217] and also giving the synonymy, incidence, type of damage inflicted by, and economic importance of each. The common names are cited in both French and English. The list includes *Cercospora personata* on groundnuts [C.M.I. map No. 152]; *C. coffeicola* [No. 59], *Corticium koleroga* [No. 64], *Glomerella cingulata* [cf. *R.A.M.*, 33, p. 412], *Hemileia vastatrix* [C.M.I. map No. 5] and its parasite *Verticillium hemileiae*, and *Thielaviopsis neocaledoniae*, all on coffee; *Sphaerostilbe repens* [No. 288] on *Litchi*; *Cercospora musae* [*Mycosphaerella musicola*: No. 7] and *Cordana musae* [No. 168] on banana; *Puccinia pruni-spinosae* on peach [No. 223]; *Uncinula necator* on vine; *Alternaria brassicae* on cabbage; *Colletotrichum lindemuthianum* [No. 177], *Isariopsis griseola*, *Uromyces appendiculatus* [No. 290], and *Cercospora cruenta* on bean (*Phaseolus vulgaris*); *Cladosporium fulvum* [No. 77], *Didymella lycopersici*, and *Septoria lycopersici* [No. 108] on tomato; *Phomopsis vexans* on eggplant; *Alternaria solani* and *Phytophthora infestans* [No. 109] on potato; *Puccinia triticina* and *Ustilago tritici* on wheat; *P. sorghi* on maize; *Curvularia geniculata* [*R.A.M.*, 29, p. 277], *Fusarium decemcellulare*, *F. moniliforme* [*Gibberella fujikuroi*: C.M.I. map No. 102], *Ophiobolus miyabeanus* [No. 92], *Leptosphaeria salvinii*, *Nigrospora oryzae*, and *Trichoconis caudata* on rice; and *Phytomonas* [*Bacterium*] *marginatum* on gladiolus. Indexes to hosts, pests, and cryptogamic pathogens are provided.

Hirst (J. M.). **Changes in atmospheric spore content: diurnal periodicity and the effects of weather.**—*Trans. Brit. mycol. Soc.*, 36, 4, pp. 375–393, 1 pl., 14 graphs, 1953.

In this paper a full account is given of the methods used and results obtained at Rothamsted Experimental Station with the automatic volumetric spore trap [*R.A.M.*, 31, p. 618] operating continuously from June to September, 1951 and 1952, at 2m. above ground. Some of the information has already been noticed from other sources [31, p. 619; 33, p. 408].

The slides are first coated with 10 per cent. solvar solution and dried before applying a thin layer of melted vaseline. At most wind speeds the trap catches *Ustilago* spores more efficiently than *Lycopodium* powder [33, p. 544]. In dry

weather pollen grains and spores of *Cladosporium* [33, p. 167], *Erysiphe*, *Alternaria*, smuts, and rusts predominate; they are most abundant in the afternoon and least so in the early morning. *Phytophthora infestans* and *Polythrincium* [*Cymadothea*] *trifolii* reach their maximum before noon. Prolonged rain removes most of these and for a while there are few spores in the air. Within a few hours of the rain commencing, however, the dry-air spora is replaced by hyaline spores, few of which are identifiable, except that they include splash-dispersed asco- and basidiospores. This damp-air spora also occurs in quantity at night when dew is formed, particularly between midnight and dawn.

Thom (C.). **The colony.**—*Mycologia*, 46, 1, pp. 1–11, 1954.

In this presidential address to the Mycological Society of America, presented on 7th September, 1953, at Madison, Wisconsin, the author discusses the development of the typical mould colony as grown in a Petri dish, the special conditions of nutrient and air supply in different parts of a colony, morphology and variability, standardization of media, and limitations to the characteristic response of the organism to the special aerobic environment provided by the surface of the nutrient substratum. It is concluded that the colony growing under standardized conditions remains the best means of describing and identifying the saprophytic moulds [cf. *R.A.M.*, 33, p. 367].

Wildman (S. G.) & Rappaport (I.). **The use of electrically conducting glass for counting lesions.**—*Science*, 119, 3102, pp. 849–850, 1 fig., 1954.

A brief description is given of a device which greatly facilitates counting the local lesions that appear on *Nicotiana glutinosa* after virus infection. A frosted, translucent, electric conducting glass mounted over a fluorescent lamp is connected to dry cells supplying 8 v. When the leaf tissue next to a lesion is punctured with a metal probe connected to the other pole of the battery, contact between the probe and the glass plate sets up a slight current which activates a reset counter. A pinprick of light shines through the puncture, indicating that the lesion has been counted. About 500 lesions on a half-leaf may be counted in two minutes.

Patel (G. A.) & Patel (M. K.). **Administration and organization of plant protection in Bombay State.**—*Plant Prot. Bull., New Delhi*, 4, 4, pp. 81–84, 1952.

The Crop Protection Scheme for Bombay State, India, is outlined. The Scheme aids the distribution and use of insecticides, fungicides and the equipment required in remote places in the State with the help of Extension staff. In 1952–3 a budget of 104,047 Rs. was provided. Within the last few years [rice] blast disease [*Piricularia oryzae*: *R.A.M.*, 33, p. 112] and the koleroga disease [*Corticium koleroga*] of areca palm [18, p. 451] have been treated free of cost. The Crop Protection Scheme, however, cannot undertake the Extension work in connexion with serious and widespread epidemics of a periodical nature, as such special problems are considered of a temporary nature. Accordingly, the koleroga disease was included among others under a special Extension Scheme with its own staff.

Schmidt (E. W.). **Die Pflanze als Patient.** [The plant as patient.]—254 pp., 16 pl., Berlin, Gebr. Borntraeger, 1953. DM 19.20.

The author presents much valuable and interesting information on the history and development from earliest times to the present day of plant diseases and the life-cycles of their agents in an unconventional and original light, the book being designed not only for the instruction of those actually engaged in agriculture or horticulture but also for the interest and entertainment of the general reader. The plant is treated as a patient for whose well-being men have striven ever since they

recognized its importance to themselves. The eight chapters deal, respectively, with knowledge of the diseased plant (pp. 5–26); beet 'exhaustion' (pp. 27–50); the great epidemic of the potato (pp. 51–90); cereal diseases (pp. 91–125); scab (*Venturia* spp.) and other fruit injuries (pp. 126–172); the diseased forest (pp. 173–203); pathogens of the vine (pp. 204–223); and plant protection (pp. 224–242).

Bockmann (H.). **Die Bedeutung der Pflanzenschutzforschung für die landwirtschaftliche Betriebsorganisation.** [The importance of research in plant protection for the organization of agricultural operations.]—*Z. PflKrankh.*, 61, 1, pp. 1–4, 1954.

Various systems of crop rotation practised in Germany [cf. next abstract] are described in relation to their effects on diseases, e.g., wheat foot rots [*Ophiobolus graminis* and *Cercosporella herpotrichoides*: *R.A.M.*, 33, pp. 205, 474] and pea foot rots [*Ascochyta pisi*, *A. pinodella*, *Fusarium* spp., and *Mycosphaerella pinodes*: 32, p. 228; 33, p. 410], and clover canker [rot: *Sclerotinia trifoliorum*: 33, p. 485].

Rademacher (B.). **Was bedeutet die Weiterentwicklung der Anbautechnik im Acker- und Pflanzenbau für den Pflanzenschutz?** [What is the significance of modern advances in cultivation technique in agriculture and horticulture for plant protection?]—*Z. PflKrankh.*, 61, 4, pp. 177–184, 1954. [English summary.]

Some of the problems incidental to new developments in German farming methods are discussed in relation to plant protection. For instance, an increase in intercropping enhances the risk of rotational diseases [cf. preceding abstract]. Significant changes in the development of diseases and pests have been induced by mechanization, notably as regards deterioration of the soil structure through pressure by tractors, the number of which in Westphalia alone has increased tenfold since 1938; this is an important contributory factor in the spread of pathogenic fungi, even obligate parasites like *Phytophthora infestans*, though its influence is most marked in the case of root and foot rots [*Ophiobolus graminis* and *Cercosporella herpotrichoides*: loc. cit.] of wheat and to a lesser extent of barley. The use of the combine harvester, moreover, has led to an increase of wheat bunt [*Tilletia caries*] through the scattering of contaminated chaff [cf. *R.A.M.*, 33, p. 530]. The sowing of monogerm beet seed is attended by augmented susceptibility to [unspecified] pre- and post-emergence infections.

Breeding for resistance is complicated by the growing demand of consumers for palatability, e.g., in potatoes, some leading resistant varieties of which have proved unacceptable by the present exacting standards.

Finally, the decline in the population of sheep, which consume infected overwintering material, has had adverse effects on field hygiene, calling for a revision of crop rotation practices.

Smith (G.). **An introduction to industrial mycology. Fourth edition.**—xiv+378 pp., 161 figs., London, Edward Arnold (Publishers) Ltd., 1954. 30*s*.

Two new chapters have been added to the present edition of this treatise [cf. *R.A.M.*, 25, p. 270], one on nomenclature (pp. 23–30) and the other an appendix dealing with the theory and practice of microscopy of moulds (pp. 346–366). The etymology of fungus names and most technical terms is explained. A few additional genera which have assumed increased importance of recent years are described and figured.

Hilborn (M. T.). **Effect of various chemicals on infection by Rhizoctonia solani and Verticillium albo-atrum.** –Abs. in *Phytopathology*, 43, 9, p. 475, 1953.

[At Maine Agricultural Experiment Station] the incidence of *Rhizoctonia*

[*Corticium solani*] on potato stems [*R.A.M.*, 33, p. 443] was materially reduced by ten days' watering with solutions of actidione, bacitracin [cf. 32, p. 267], polymyxin [cf. 31, pp. 356, 621], rimocidin [cf. 31, p. 395], and streptomycin, and to some extent by 8-quinolinoline sulphate, magnamycin, penicillin, and thiolutin, while all the antibiotics except aureomycin, magnamycin, and terramycin caused a considerable decrease of infection by *Verticillium* [*albo-atrum*] on potato [31, p. 350].

The infection of lettuce by *C. solani* in sand was inhibited completely by five to ten days' watering with magnamycin, substantially by rimocidin and thiolutin, and to a lesser degree by streptomycin and chloromycetin [chloramphenicol].

In parallel series with tomato polymyxin, rimocidin, thiolutin, and streptomycin were largely, and bacitracin and penicillin fairly effective against *C. solani*, while the incidence of infection by *V. albo-atrum* was much reduced by all the chemicals except chloramphenicol and magnamycin.

Durocher (J.) & Lagneau (C.). **Sur les inconvénients que peuvent présenter en conserverie les résidus de certains produits anticryptogamiques ayant été utilisés pour le traitement des fruits.** [On the drawbacks in the preserving factory of the residues of some fungicides used for the treatment of fruits.]—*C.R. Acad. Agric. Fr.*, 38, 18, pp. 731–735, 1952.

Experiments conducted at the National Institute of Preserves, France, showed that the slightest trace of micronized wettable sulphur on apricots resulting from applications to the trees for the control of *Monilia* [*Sclerotinia*] *fructigena* and *M. cinerea* [*S. laxa*: *R.A.M.*, 33, p. 161] were sufficient to ruin an entire lot of tinned fruit in syrup or pulp in natural juice. As hydrogen sulphide formation takes place immediately following sterilization, the state of the tins deteriorates throughout the preservation period.

Atkins (W. R. G.) & Warren (F. J.). **The preservation of fishing nets, trawl twines and fibre ropes for use in sea water.**—*J. Mar. biol. Ass. U.K.*, 31, 3, pp. 509–514, 1953.

In this further series of experiments at the Plymouth Laboratory, Marine Biological Association [*R.A.M.*, 15, p. 504], copper naphthenate preservatives were the most durable of those tested on cotton netting in a clean sea-water basin, but Olie's cutch [loc. cit.] and ammoniacal copper sulphate treatment was almost as effective and more economical. Very good results were also obtained with aluminium stearate in petrol, which ranked with the copper soaps. The best treatments conferred an extension of durability of from 5½ to nine months.

On trawl twines the British Columbia grade of cuprinol (copper naphthenate) proved superior to all the other preservatives tested, the treated material lasting 16 months as against nearly nine for untreated manila samples.

Mandels (G. R.). **The properties and surface location of an enzyme oxidizing ascorbic acid in fungus spores.**—*Arch. Biochem., N.Y.*, 42, 1, pp. 164–173, 3 graphs, 1953.

In experiments at the Pioneering Research Laboratories, United States Army Quartermaster Corps, Philadelphia, Pennsylvania, spores of *Myrothecium verrucaria* [*R.A.M.*, 32, p. 392 and next abstract] actively oxidized ascorbic acid [see next abstract] by means of an enzyme situated at the surface of the spores. It is readily extracted by grinding but cannot be released from intact spores in the presence of toluene or merthiolate. It differs from the vitamin C-oxidizing systems already described in resistance to inhibitors and in specificity.

Mandels (G. R.). **The atypical ascorbic acid oxidase in fungus spores—its inactivation by isoascorbate and its specificity.**—*Arch. Biochem., N.Y.*, 44, 2, pp. 362–377, 6 graphs, 1953.

The specificity of the enzyme of *Myrothecium verrucaria* spores for L-ascorbic acid [see preceding abstract] appears to be absolute; it is irreversibly inactivated by D-isoascorbic acid, but only in the presence of oxygen. The inactivation process was shown to be markedly dependent on pH and to have a positive temperature coefficient.

Mostafa (M. A.). **Adventitious-root formation by fungal pathogen metabolites as a possible mechanism of disease resistance.**—*Nature, Lond.*, 174, 4419, pp. 86–87, 1 fig., 1954.

In the Department of Botany, Cairo University, further studies on the formation of adventitious roots in resistant varieties in response to stimulation from metabolic products of a fungal pathogen [cf. *R.A.M.*, 27, p. 577] have shown that unheated culture filtrates of *Fusarium solani* grown on seedling extracts of the resistant cotton variety Karnak induced adventitious roots on cut shoots of the same variety but not when grown on the extracts of the susceptible Giza 26 and tested on that variety. Similarly *F. oxysporum* and *F. moniliforme* [*Gibberella fujikuroi*] grown in extracts of the resistant tomato Myco.1 caused root formation in it but when grown in extracts of the susceptible North Dakota did not induce roots in that host. The author considers that this root formation is related to the ability of resistant varieties to counteract fungal infection.

Aschan (Karin) & Norkrans (Birgitta). **A study in the cellulolytic variation for wildtypes and mutants of Collybia velutipes. I. and II. Relations to different nutrient media.**—*Physiol. Plant.*, 6, pp. 564–583, 1 fig., 8 graphs; pp. 829–836, 2 graphs, 1953.

Monokaryon and dikaryon isolates of *Collybia velutipes* from *Salix*, oak, alder, poplar, birch, beech, mulberry, ash, elder, elm and *Cytisus* and mutants from these were cultured on a synthetic medium containing cellulose in the form of pulped filter paper, in studies at the Institute of Physiological Botany, Uppsala University, Sweden. The presence of merthiolate prevented the growth of mycelial plugs on the plates, but a measure of the cellulolytic activity of the isolate was given by the diameter of a clear zone appearing round the plug in the opaque medium. No correlation was found to exist between cellulolytic activity and morphological variation in the isolates, nor with the host tree.

An increase in the amount of yeast extract in the medium increased the activity of a weakly cellulolytic isolate, the same result being obtained by omitting glucose from the medium. Strongly cellulolytic isolates were unchanged in their activity on a richer yeast medium and on a glucose-free one.

Mathew (K. T.). **Thiamine, its intermediates and growth of Corticium microsclerotia (Matz) Weber.**—*Proc. Indian Acad. Sci.*, Sect. B, 38, 1, pp. 1–10, 1953.

A pure culture of *Corticium microsclerotia* [*R.A.M.*, 33, p. 367] on glucose nitrate medium was found to be thiamine-heterotrophic. With an optimum amount of 2 μg in 20 ml. of medium, it reached its maximum growth in about 15 days. It grew almost equally well when supplied with an equimolar mixture of thiazole and pyrimidine, and was capable of slowly synthesizing thiamine from pyrimidine alone, but not from thiazole.

Fåhraeus (G.) & Lindeberg (G.). **Influence of tyrosine and some other substances on the laccase formation in Polyporus species.**—*Physiol. Plant.*, 6, pp. 150–158, 1953.

In further studies at the Royal Agricultural College, Uppsala, Sweden, on the production of laccase by *Polyporus* spp. [*R.A.M.*, 32, p. 224], an increase in both *P. zonatus* and *P.* [*Polystictus*] *versicolor* was obtained by the addition to the medium of tyrosine, *p*-hydroxybenzoic acid, tryptophane, anthranilic acid, or indole. None of these compounds was oxidized by the enzyme.

Köhler (E.). **Ein unbekanntes Kartoffelvirus. (Vorläufige Mitteilung.)** [An unknown Potato virus. (Preliminary note.)]—*Ber. dtsch. bot. Ges.*, 66, 1, pp. 63–65, 2 figs., 1953.

A virus distinct from any hitherto reported in Germany was observed in potato plants of a selected line received from the Rhineland at the Virus Research Institute, Celle, in the summer of 1951. The mechanical inoculation of cut leaves of *Solanum demissum* (strain S) with sap from the infected plants resulted either in the development within a fortnight of blackish, necrotic dots or no symptoms. On *Gomphrena globosa* leaves the virus produced after 11 days chlorotic spots which during the next nine days assumed a slightly raised, circular shape and an ochre-brown coloration with well-marked red to purple margins and occasionally a whitish centre. No symptoms occurred on *Datura stramonium*, Samsun tobacco, or tomato inoculated with the new virus, though it was present in a high concentration in the last-named. It also delayed infection of but failed to give protection to Up-to-Date tomato seedlings with a necrotizing strain of potato virus X. The sap of potato leaves with the new virus reacted negatively to precipitation with potato virus X antiserum. The virus was inactivated within the same temperature range as potato virus X.

O. Bode's (unpublished) electron-microscope studies revealed rod-shaped particles in the sap of tomato plants inoculated with the new virus, which it is thought may possibly be identical with one recently described from Holland [*R.A.M.*, 32, p. 145].

Pozděna (I.), Polyak (Z.), & Blattný (C.). Влияние летней посадки Картофеля, пораженного вирусными заболеваниями, на улучшение состояния его здоровья. [The influence of summer planting of Potato, infected with virus diseases, on the improvement of its state of health.]—За соц. сельскохоз. Науку, Сер. A [*Socialist. agric. Sci.*, (*Czechoslovakia*), Ser. A], 3, 2, pp. 160–169, 1954.

In field trials in Czechoslovakia progenies from summer-sown (July, 1951) potato crops infected with potato virus Y [*R.A.M.*, 33, p. 552] planted in April, 1952, showed a significant disease reduction, 5·8 per cent. (Erstling) [Duke of York] and 2·9 (Triumph) less than in the progenies from spring-sown crops, virus symptoms being much weaker in 1952.

Munro (J.). **Maintenance of virus X-free Potatoes.**—*Amer. Potato J.*, 31, 3, pp. 73–81, 1 fig., 1954.

The subjects discussed in this paper on potato virus X, presented to the Symposium on Potato Virus Diseases at the 40th Meeting of the Potato Association of America at Madison, Wisconsin, on 7th September, 1953, are reduction in yield, strains, the need for virus-free stocks and maintaining them so, variations in clonal potato stocks, and methods of testing potatoes for the presence of virus X employed in Great Britain [*R.A.M.*, 33, p. 551], Germany [33, p. 497], Holland, South Africa, and Canada and the author's own field drop test method (Report to the Council of the National Institute of Agricultural Botany, 1951). Drops of sap are squeezed

from a potato leaflet on to either end of a microscope slide. To one is added a drop of suitably diluted virus X rabbit antiserum and to the other normal serum. Each is stirred and precipitation should occur within ten seconds. The author concludes that it is only when healthy potatoes are grown in proximity to virus X-infected plants that there is any likelihood of a breakdown in virus-free stocks.

Peterson (C. E.), Ellis (N. K.), Akeley (R. V.), & Stevenson (F. J.). **Cherokee : A new medium-maturing Potato variety resistant to common scab, late blight, mild mosaic, and net necrosis.**—*Amer. Potato J.*, 31, 3, pp. 53–58, 1954.

In addition to the features previously reported [*R.A.M.*, 32, p. 178] the potato variety Cherokee is also field immune from mild mosaic [virus] and somewhat resistant to net necrosis (leaf roll virus). In 1950 and 1951 in Maine the average net necrosis was 5·2 per cent., as compared with 41 per cent. for Green Mountain. In nearly all the comparative trials [loc. cit.] in Indiana (1950), Minnesota (1950–52), and Maine (1947–52) Cherokee gave better yields than Irish Cobbler.

Norris (D. O.). **Purple-top wilt, a disease of Potato caused by Tomato big-bud virus.**—*Aust. J. agric. Res.*, 5, 1, pp. 1–8, 3 pl., 1954.

In Australia the first symptom of purple top wilt of potatoes, caused by tomato big bud virus [*R.A.M.*, 30, p. 18; 33, p. 209], is the pale green colour of one or more shoots, which also appear stiff, the petioles being erect. At the growing tip at this time the basal parts of the leaflets are developing interveinal chlorosis and the leaflet edges are beginning to roll upwards. During the next few days the leaves become partly rolled, and the interveinal chlorosis of the young upper leaves becomes conspicuous; the basal half of the leaflet is 'pinched in' and develops a purple pigment. Symptom expression is most intense five to seven days after onset. Pigmentation appears also in the top of the stem and in the petioles. Next, though the leaves remain rolled, the plant begins to wilt, the pigment fades, and general chlorosis becomes more marked. Ten to 15 days after onset the shoot collapses and dies. If a plant has more than one stem, usually only one is affected at first, the others being attacked subsequently at intervals.

Severe necrosis of the stem phloem accompanies the symptoms and is detectable at the outset in the internal phloem by the phloroglucinol test. This necrosis becomes progressively more marked as the aerial symptoms intensify, reaching the external phloem as the plant enters on the wilting phase, and is visible to the naked eye, constituting a useful diagnostic feature.

If tubers have formed when the plant is attacked, they become flaccid and have varying degrees of stem browning. In storage they develop spindle or hair sprout. Occasionally all tubers from an affected plant may give normal sprouts, or sometimes a growth of small, secondary tubers. If the plants are fairly young when attacked, or if cool, moist conditions prevail, they may persist for some time before collapsing, or they may make varying amounts of axillary growth. These axillary shoots may be almost normal or may become increasingly swollen and pigmented, forming eventually heavily pigmented, axillary tubers.

Katahdin and Sebago [22, p. 221] develop symptoms quickly and intensively. In unpigmented varieties such as Carman there is no purpling, but all other symptoms are present. On Bismark the leaves in addition to becoming pigmented develop extensive interveinal necrosis.

In 1949–50 the disease was transmitted by grafting to young *Datura stramonium* plants and Kondine Red tomato by the irrigated scion technique. Successful transmission to potato by dodder (*Cuscuta campestris*) with the production of purple top wilt was later made by Helms (unpublished data).

The direct loss of yield resulting from current-season infection may be considerable, as many of the tubers are unsaleable. Infections of up to 50 per cent. have

been recorded, and 10 to 20 per cent. are common in a bad season. Furthermore, an infection of 14·5 per cent. may entail a loss of 6 per cent. from missing hills in the next crop.

Guntz (M.) & Ponchet (J.). **Essais de traitement du mildiou de la Pomme de terre.** [Experiments on the treatment of Potato mildew.]—*Phytiatrie-Phytopharm.* 2, pp. 21–25, 1952.

Under favourable climatic conditions potato mildew [*Phytophthora infestans*] has caused severe damage [in France] in recent years in spite of the widespread practice of spraying, often more frequently than is normally recommended [*R.A.M.*, 29, p. 428]. The high incidence is probably due to exceptionally early infection and the use of commercial materials containing very little copper. Accordingly, various zinc-based materials were compared with 2 per cent. Bordeaux mixture on the Bintje variety at Versailles in 1951. The control conferred by 2 per cent. zineb applied every 10 to 12 days was equal to that of Bordeaux every 21 days. Once the interval between the zinc treatments extended beyond 12 days, however, their efficiency decreased markedly.

Zadina (J.). Селекция Картофеля на сопротивляемость против плесени. [Selection of Potatoes for resistance to blight.]—За. соц. сельскохоз. Науку, Сер. A [*Socialist. agric. Sci.*, (*Czechoslovakia*), Ser. A], 3, 2, pp. 169–181, 1954.

Tests of 5,232 potato hybrids from crosses of parental lines known to be resistant to blight (*Phytophthora infestans*) [*R.A.M.*, 30, p. 537], carried out in Czechoslovakia in 1951 and 1952, showed that 49 per cent. were resistant to 15 different races of the fungus. Of 4,610 hybrids with one resistant parent, 46 per cent. showed resistance.

Brücher (E. H.) & Ross (H.). **La importancia de las especies tuberíferas de 'Solanum' del noroeste argentino como fuente de resistencia a las enfermedades.** [The importance of the tuberous species of *Solanum* in north-western Argentina as sources of resistance to diseases.]—*Lilloa*, 26 (*1953*), pp. 453–488, 3 pl., 4 figs., 2 graphs, 1953. [German summary. Received August, 1954.]

This information concerning the resistance to viruses X, Y, and leaf roll and to *Phytophthora infestans* of 24 collections of wild *Solanum* spp. from north-western Argentina has already been noticed from another source [*R.A.M.*, 31, p. 138].

Bazán De Segura (Consuelo) & Carrera (J. M. L.). **Experimento comparativo de fungicidas para el control del 'hielo' de la Papa, en el Valle de Carabayllo.** [Comparative experiment with fungicides for the control of Potato 'blight' in the Valley of Carabayllo.]—*Inf. Estac. exp. agríc., Lima*, 81, 16 pp., 3 graphs, 1953. [English summary. Mimeoprinted.]

Of five fungicides tested in 1952 in the Valley of Carabayllo, Peru, for their relative efficiency in the control of potato blight (*Phytophthora infestans*) [*R.A.M.*, 30, p. 536; 33, p. 554], dithane Z-78 (1·5 lb. per 100 gals. water) gave the best results, raising the yields of the white and yellow types (*Solanum tuberosum* ssp. *andigenum* [*S. andigenum*] and *S. goniocalix*) from 2,976 and 819 to 10,072 and 5,830 kg. per ha., respectively, and reducing the average incidence of infection from 59·6 to 11·8 per cent. However, the four other preparations, namely, fytolan (4 lb.), copper A (5 lb.), perenox (2·5 lb.), and copper Shell (3 lb.), also produced significantly higher yields than those obtained from the untreated plots and lowered the percentage of infection by more than half.

Richardson (J. K.) & Heeg (T. J.). **Potato common scab investigations. I. A survey of disease incidence in southern Ontario.**—*Canad. J. agric. Sci.*, 34, 1, pp. 53–58, 1 diag., 1954.

During 1948 and 1949 field surveys of the more important potato growing areas in southern Ontario were conducted in order to determine the correlation between the crop sequences, cultural practices, various soil factors, and the incidence of potato scab (*Streptomyces* [*Actinomyces*] *scabies*) [*R.A.M.*, 32, pp. 665, 693]. Incidence varied from 1 to over 33 per cent., infection ranging from deep pitted lesions to superficial scurfy areas. The crop preceding potatoes in the rotation influenced the amount of scab to a certain extent, incidence being lowest following soy-beans [29, p. 381]. Scab was lowest at pH values below 5·5. There was no relation to either soil texture or the amount of chemical fertilizer applied to potatoes [cf. 33, pp. 314, 555]. In 1948 the relationship between the incidence of scab and organic matter and total nitrogen in the soil was negative, while in 1949 the reverse was true in the one county surveyed.

Shoemaker (R. A.) & Riddell (R. T.). **Staining Streptomyces scabies in lesions of common scab of Potato.**—*Stain Tech.*, 29, 2, pp. 59–61, 4 figs., 1954.

The application of toluidine blue to slide cultures of *Streptomyces* [*Actinomyces*] *scabies* or to potato scab lesions is based on the metachromaticism of volutin, a constant constituent of the mycelium and spores. Sections or smears are fixed in 5 parts of formalin, 7·5 of propionic acid, and 87·5 of 50 per cent. alcohol, stained in a 1 in 100 dilution of saturated aqueous toluidine blue from 20 minutes to 24 hours, dehydrated in an acetone-xylene series, and mounted. Cellular constituents of the tuber stain blue or are colourless, whereas the mycelium of *A. scabies* appears as a series of red spheres in the blue-stained cytoplasm. The pathogen may be differentiated from other micro-organisms and cells in the region of the lesion by these reactions and the 1 μ diameter of the mycelium.

Cooper (D. C.), Stokes (G. W.), & Rieman (G. H.). **Periderm development of the Potato tuber and its relationship to scab resistance.**—*Amer. Potato J.*, 31, 3, pp. 58–66, 11 figs., 1954.

The production and development of potato varieties resistant to scab (*Streptomyces* [*Actinomyces*] *scabies*) is hindered by the lack of a reliable diagnostic resistance test for seedlings [cf. *R.A.M.*, 33, p. 555], and at present reaction can be determined only by cultivating promising seedlings for some years in a scab nursery [cf. 33, p. 443]. It appeared, therefore, that a determination of the nature of the tuber periderm might prove valuable in selecting resistant seedlings or first generation clones. Consequently the course of development of the periderm during early stages of tuber development and its nature in the mature tuber were determined for seven resistant varieties, namely, Cherokee, Ontario, Hindenburg, M330, M439, Iowa 6316, and B515–2, ten susceptible, and some seedlings at the University of Wisconsin. The technique is simple: thin freehand sections, stained in aceto-carmine, are warmed over a flame; 40 to 50 accurate readings may be taken in the course of a few hours. Where the periderm persists as a living tissue throughout development, the tuber is scab-resistant. It is susceptible when the periderm of the growing tuber is covered by collapsed dead cells. Scab resistance is not necessarily associated with a russet skin. On some soils or under certain climatic conditions resistant varieties may develop occasional superficial lesions. These may be caused by unbalanced growth of the tuber, the outermost layers not readily disintegrating and leaving a few layers of senescent cells on the surface for a time. If infection takes place during this period lesions would form. It is possible that some of the more virulent strains may be able to affect the living cells of the periderm of resistant varieties. This would explain their occasional lesions.

In these tests the following seedlings were resistant in highly infested soil: A17, M804, M304, Minn. 113, and 303–40.

Hey (A.). **Die phytopathogenen Grundlagen der Kartoffelpflanzguterzeugung.** [The phytopathogenic bases of seed Potato production.]—*Dtsch. Landw.*, 5, 6, pp. 302–306, 1954.

Diseases affecting the German potato crop are divided into three groups from the standpoint of their importance in 'seed' production. Two fungi occupy a special position, namely, *Synchytrium endobioticum* [*R.A.M.*, 33, p. 173 and above, p. 588] and *Spongospora subterranea* [28, p. 639], the latter being present on loose, damp soils throughout the central mountain chain of eastern Germany and probably also in the coastal areas of Mecklenburg.

To the second category belong the viruses [33, p. 410], among which leaf roll and viruses Y, X, and A are assumed to be concerned in 70, 30, 20, and 10 per cent., respectively, of all cases of viroses. Blackleg (*Bacterium phytophthorum*) [strain of *Erwinia carotovora*: 32, p. 642] is a constant source of stand reduction on damp, firm soils, on which resistant varieties, such as Flava, Johanna, Immertreu, and Toni should be cultivated.

The third group comprises the following organisms which impair seed quality only when their incidence exceeds certain vaguely defined limits: *Corynebacterium sepedonicum* [C.M.I. map No. 20], *Verticillium albo-atrum*, *Phytophthora infestans* [*R.A.M.*, 33, p. 499], *Alternaria solani* [33, p. 554], *Spondylocladium atrovirens* [C.M.I. map No. 233], *Colletotrichum atramentarium* [cf. *R.A.M.*, 21, p. 431; 33, p. 314], and *Streptomyces* [*Actinomyces*] *scabies* [33, p. 556].

Kameraz (A. Y.). Новые фитофтороустойчивые и ракоустойчивые сорта Картофеля. [New *Phytophthora*- and wart-resistant Potato varieties.]—Сад и Огород [*Orchard & Garden*], *1954*, 1, pp. 45–48, 2 figs., 1954.

Kameraz [*R.A.M.*, 32, pp. 208, 395], a new high-yielding potato variety resistant to *Phytophthora* [*infestans*: loc. cit.] and wart [*Synchytrium endobioticum*: 33, p. 173], has been developed from repeated crossing between *Solanum demissum* and Granat (twice), Narodnuy [National], and Zikingen at the Pan-Soviet Institute of Plant Breeding, U.S.S.R. Preliminary information indicates that Puskinsky (U8–236), an early variety, and Detskosel'sky (R8–168), medium early, are both resistant to wart and more resistant to *P. infestans* than most of the early or medium early varieties.

Jones (E. D.) & Darling (H. M.). **Influence of nutrition, Potato varieties, and isolates of Alternaria solani upon disease development.**—Abs. in *Phytopathology*, 43, 9, pp. 476–477, 1953.

The pathogenicity of 29 isolates of *Alternaria solani* [cf. *R.A.M.*, 33, p. 554] collected in Wisconsin ranged from mild to severe on Triumph potato and Bonny Best tomato. Isolates highly pathogenic to potato did not necessarily attack tomato with equal severity. In controlled nutritional tests low nitrogen and magnesium levels accentuated the symptoms on potato. At low potassium and phosphorus levels the pathogen was less virulent than in the foregoing series, but considerably more so than in low calcium or balanced solutions. In the field the susceptibility of potato plants was greatest at the post-blossom stage. Nitrogen and magnesium decreased with age in potato leaf tissue collected from commercial fields, while potassium was also highest at the pre-blossom stage and lowest at flowering time. The lower leaves contained the least nitrogen at the three blossom stages. Nitrogen, potassium, and magnesium were more abundant in disease-free potato plants than in infected ones.

Votoupal (B.). Железистая пятнистость Картофельных клубней. [Iron spots of Potato tubers.]—За соц. сельскохоз. Науку, Сер. A [*Socialist. agric. Sci.*, (*Czechoslovakia*), Ser. A], 3, 2, pp. 181–200, 2 figs., 15 graphs, 1954.

Iron spots [? internal rust spot: cf. *R.A.M.*, 33, p. 558] observed on the tubers of the following potato varieties in Czechoslovakia, Ackersegen, Blanik, Borovinny, Carmen, Draga, Figua, Cardinal, Flora, Radan, Dagmar, Arran Luxury, Arran Scot, Baltic, Centre, Dar, Don, Pearl, Epicure, Frumulé, Furore Frühgold, Glover, Immertreu, Sickingen, and Weisses Rössl, were found to be of physiological origin and influenced by climatic conditions, particularly erratic rainfall during the period of maturation. The spots are most widespread on larger tubers (4 to 7 cm. in size) and, although they do not affect the yield, the tubers are rendered quite useless. Applications of boron (242 kg. per ha.) and manganese (74 kg.) increased iron spot incidence from 7 per cent. (untreated) to 31 and 15 per cent., respectively.

Volk (G. M.) & Gammon (N.). **Potato production in Florida as influenced by soil acidity and nitrogen sources.**—*Amer. Potato J.*, 31, 3, pp. 83–92, 2 figs., 2 graphs, 1954.

The unidentified type of leaf roll (probably not of virus origin) occurring on potatoes in Florida [*R.A.M.*, 32, p. 206] is most severe on relatively new lands where there are very acid conditions and high ammonia content. Lime improved the condition on old land but had little effect on new. It appeared that this leaf malformation could develop at any stage of growth if the plant had insufficient supplies of nitrate. In the Florida tests deficiency of potassium was thought to be an enhancing factor. Lime applications were possible only if varieties resistant to scab [*Actinomyces scabies*], such as Sebago which has proved acceptable for the Hasting area, were grown. Side dressings of nitrate at planting and potassium nitrate at blossom time completely reduced nutritional leaf roll of potatoes grown on light, strongly acid soil.

Hakamura (Y.) & Shimomura (T.). **Biochemical studies of Piricularia oryzae. Part 1. Attitude of Piricularia oryzae to L-amino acids in the medium containing trace of carbon source.**—*J. agric. chem. Soc. Japan*, 27, 10, pp. 694–699, 3 graphs, 1953. [Japanese, with English summary.]

At the Department of Agricultural Chemistry, University of Hokkaido, Japan, *Piricularia oryzae*, the agent of rice blast [*R.A.M.*, 33, p. 559], grew in a culture containing L-glutamic acid, L-aspartic acid, or L-leucine [32, p. 450] with only a trace of other carbon or none. The first-named was the most effectively utilized. It appears that the amino acid is converted to ammonia and an α-keto acid.

Padmanabhan (S. Y.) & Ganguly (D). **Relation between the age of Rice plant and its susceptibility to Helminthosporium and blast diseases.**—*Proc. Indian Acad. Sci.*, Sect. B, 39, 2, pp. 44–50, 1954.

At the Central Rice Research Institute, Cuttack, Orissa, leaf inoculations with *Cochliobolus* [*Ophiobolus*] *miyabeanus* [*R.A.M.*, 32, p. 34] were made on potted rice plants at the end of July or beginning of August, in September, and at the end of October or beginning of November, two susceptible varieties, Benibhog and T. 1145, being used in 1949 and the resistant T. 141 in 1950. In all three susceptibility increased with age, though varietal susceptibility remained constant. September inoculations produced the highest amount of infection in all plants of all ages; this was conspicuous in 45- to 50- and 92- to 95-day-old plants of all three varieties in 1950.

Susceptibility to blast, *Piricularia oryzae* [33, pp. 112, 559], was studied in two field experiments, using the moderately susceptible T. 1145 in 1950 and the very susceptible Co. 13 in 1951. Younger plants proved most susceptible, resistance increasing with age. Only the post-planting age affected susceptibility and varietal susceptibility remained constant.

AGNIHOTHRUDU (V.). **Soil conditions and root diseases VIII. Rhizosphere microflora of some of the important crop plants of South India.**—*Proc. Indian Acad. Sci.*, Sect. B, 37, 1, pp. 1–13, 6 graphs, 1953.

Further work in this series [cf. *R.A.M.*, 32, p. 430] showed that *Aspergillus* spp. predominated in the rhizospheres of potted plants, particularly *Sorghum dochna* var. *irungu* and cotton, studied at different periods from 15 days to three months after germination. In general, both in the unplanted soil and in the rhizosphere the percentage of *Aspergillus* spp. decreased towards the final estimation except in those plants which flowered, viz., French bean (*Phaseolus vulgaris*), cluster bean (*Cyamopsis tetragonoloba*), sesame, and sann hemp (*Crotalaria juncea*), where an increase was recorded after flowering. *Penicillium* spp. increased gradually in numbers as the plants grew older.

The changes in total numbers of fungi corresponded roughly to the changes in numbers and percentage of *Aspergillus* and *Penicillium*. *Fusarium* spp. were encountered regularly in the rhizosphere dilutions but very rarely in the control soil, the highest incidence occurring with pigeon pea and the lowest with *S. dochna* var. *irungu*. Though *Macrophomina phaseoli* [33, p. 451] was identified on the roots of all seedlings and increased in the final stage of growth of French bean and cluster bean it was not obtained in dilution plates. *Neocosmospora vasinfecta* [33, p. 517] was very rarely obtained in the dilution plates, but was detected on roots at most stages, the highest percentage being on pigeon pea. Neither *N. vasinfecta* nor *M. phaseoli* was present in the sorghum rhizosphere. *Alternaria*, *Stemphylium*, *Curvularia*, *Helminthosporium*, *Trichoderma*, *Mucor*, *Rhizopus*, *Cunninghamella*, *Phoma*, *Diplodia*, and *Chaetomium* spp. were often recorded in rhizosphere dilutions and root platings. Their incidence in plants that did not flower during the test period was irregular but in those that flowered there was a definite increase in the numbers and percentage present at the final estimation.

YAMASAKI (T.). **Studies on the 'excess-moisture injury' of upland crops in over-moist soil from the viewpoint of soil chemistry and plant physiology.**—*Bull. Nat. Inst. agric. Sci. Tokyo*, Ser. B, 1, pp. 1–92, 15 col. pl., 90 figs., 1952. [Japanese, with English summary.]

A considerable area of arable land in Japan is waterlogged after rain; 25 per cent. of the paddy fields under winter crops and about 10 per cent. of upland fields are affected and the crops suffer serious root injury. The author concludes from this detailed anatomical study that resistance to injury from excess moisture is correlated with the amount of lignification in the root cortex and root hairs, making them impermeable to toxins, and with the arrangement of cells in the cortex designed to improve the conduction of air to the tissues.

MASUMOTO (S.). **Taxonomic studies of soil Actinomyces in Japan. I and II.**—*Bot. Mag., Tokyo*, 65, 765–766, pp. 71–76; 767–768, pp. 123–127, 1952. [Japanese.]

Various *Actinomyces* spp. isolated from forest, field, and compost soils in Japan were grown for 10 to 14 days on 12 culture media at 30° C. and on a gelatin medium at 20°. From their morphological and physiological charac-

teristics four species were identified as *A. violaceus-ruber*, *A. viridochromogenus*, *A. albosporeus* [*R.A.M.*, 26, p. 513], and *A. roseochromogenus*.

CHINN (S. H. F.). **A slide technique for the study of fungi and actinomycetes in soil with special reference to Helminthosporium sativum.**—*Canad. J. Bot.*, 31, 6, pp. 718–724, 3 pl., 1953.

A slide technique suitable for studying the behaviour of soil fungi and actinomycetes both qualitatively and quantitatively is described from the University of Saskatchewan, Saskatoon [*R.A.M.*, 33, p. 474]. Slides dipped in agar spore suspensions of *Helminthosporium sativum* [loc. cit.], *Fusarium culmorum*, *Ustilago nuda*, *U. hordei*, *Penicillium notatum*, *Stachybotrys atra*, *Cladosporium* sp., *Trichoderma* sp., *Aspergillus* sp., and an actinomycete were partially inserted ($\frac{1}{4}$ in. deep) in a vertical position in glazed crocks half-filled with soil, more soil being added to cover them when the agar had solidified. The crocks were covered to conserve moisture, water being added when necessary. After incubation at room temperature for each specified period (16 and 40 hours, 4, 7, and 14 days) a slide was extracted carefully, most of the adhering soil rinsed away, the agar removed from one surface, and the slide stained for 10 mins. in a dilute solution of cotton blue in lactophenol.

Only *P. notatum*, *S. atra*, and the actinomycete germinated in natural soil. Lysis of the germ tubes of the first two was observed on the fourth day, whereas the actinomycete continued to grow to the seventh day at least. In natural soil amended with 2 per cent. soy-bean meal all the fungi except *U. nuda* germinated but only *F. culmorum* and the actinomycete continued to grow and sporulate, lysis occurring in the others on the fourth day. In sterile soil growth was extensive for the first few days but after that it was limited and sporulation rare.

LIKAIS (R.). **Über den Einfluss des Bodens und antagonistischer Bodenmikroben auf den Parasitismus von Pythium de Baryanum.** [On the influence of the soil and antagonistic soil microbes on the parasitism of *Pythium debaryanum*.]—*Arch. Mikrobiol.*, 18, 1, pp. 49–100, 3 figs., 2 diags., 4 graphs, 1952. [Received August, 1953.]

This paper is the tenth of the contributions, edited by E. Schaffnit, to the knowledge of the interrelations between cultivated plants, their parasites, and the environment [see next abstract].

The author gives extensive details of tests on the effect of the soil and various micro-organisms (*Fusarium*, *Penicillium*, *Rhizoctonia* [*Corticium*] *solani*, *Trichoderma koningi*, and *T. lignorum* [*T. viride*]) on the growth and virulence of various strains of *Pythium debaryanum* to lucerne, garden cress (*Lepidium sativum*), and cabbage. The strains differed considerably in pathogenicity and in host specificity. The toxic activity of the pathogen, in part brought about by root injury and in part by a toxic substance, decreased proportionately to the length of its stay in the soil. The protection afforded to the host plant by the soil is of two kinds: (1) soil microbes appear to inhibit the growth of *P. debaryanum*, though autolytic processes cannot be excluded; and (2) the soil colloids inhibit the growth of the pathogen proportionately to their content, and hence the intensity of infection. That natural soils contain an inhibiting agent of their own [*R.A.M.*, 32, p. 643] was demonstrated by leaching clay soil, after which infection increased, whereas it decreased in sand and humus treated with the clay filtrate. Through its colloidal content the soil is capable of adsorbing toxins and weakening or destroying the virulence of the pathogen [cf. 33, p. 168]. Although this adsorption affects equally the antibiotics produced by micro-organisms, the final result is favourable to the host plant. This abiotic effect partially survives sterilization.

The protective effect of soil is increased by addition of copper ions; apart from their fungicidal action, they inhibit or chemically modify the toxins; copper sulphate inhibits or inactivates the toxins even within the leaf cells of the host, but the effect of copper is weakened by the soil colloids. Owing to this modification of the toxic substances by the soil, the immediate toxic effect on the host plant is not always a reliable indicator of the extent of damage in the soil. Non-parasitic fungi can also produce toxins injurious to the cells of higher plants. The growth of *Pythium* through soil was demonstrated by inverting test tubes lined with agar into a dish of sterilized soil. One of the tubes was inoculated with the fungus which grew through the soil and into the non-inoculated tubes.

On agar some *Trichoderma* strains were very inhibitory to *Pythium*. The pathogen did not grow at all in the culture solutions of the *Penicillium* antagonists and only slightly in that of the *Fusarium*, whereas with the *Trichoderma* strains growth was sometimes increased and sometimes somewhat reduced.

Neumann (P.) & Schaffnit (E.). **Über den Einfluss des Bodens, insbesondere von Torf- und Moorboden, auf die Infektion von Keimlingen landwirtschaftlicher und gärtnerischer Kulturpflanzen durch parasitäre Bodenpilze.** [On the influence of soil, especially of peat and bog soil, on the infection of seedlings of agricultural and horticultural crops by parasitic soil fungi.] — *Z. PflBau*, 4 (48), 6, pp. 241–251, 6 graphs, 1953.

This is the twelfth of E. Schaffnit's contributions to this subject [see preceding abstract]. Seedlings and young plants were grown in sand and mixtures of peat (sphagnum or sedge) and sand with the peat content increasing from 5 to 40 per cent. The acidity was reduced to a pH of 6 to 7; the water content was kept approximately the same, though varied to suit the particular parasite examined. The seeds were first treated with 0·2 per cent. formaldehyde, washed, germinated, and planted 1 to 4 cm. deep in the medium.

In the test with *Fusarium nivale* [*Calonectra nivalis*] sterilized blades of rye penetrated by mycelium were placed from 1 to 3 cm. beneath the shoots of germinating rye and the plants were grown in a chamber with a relative humidity of 95 to 100 per cent. and an average temperature of 7° C. Sphagnum peat from the high moors gave good protection to winter rye against infection by *C. nivalis*, the damage being at a minimum with 10 per cent. peat.

With agar inoculum of *Pythium debaryanum* [loc. cit.] at a soil humidity of 70 to 80 per cent. and temperatures averaging 16° (min. 8°, max. 28°) damage to lucerne was very slight in sphagnum peat. Protection of cauliflower (Erfurter Zwerg) against *Rhizoctonia* [*Corticium*] *solani* at an average temperature of 14° (min. 8°, max. 24°) and soil humidity of 60 to 70 per cent. was clearly better with 10 or 20 per cent. sphagnum peat, but the large difference between sterilized and unsterilized soil after seven days suggests that this was due to biotic factors. Neither sphagnum nor sedge peat gave any protection to the yellow sweet lupin against a strain of *C. solani* specific to Leguminosae. Infection by *Calonectria nivalis*, *P. debaryanum* and *Corticium solani* could be almost fully suppressed by strongly acid peat mixtures or bog soils (pH 4·6), but the host plants suffered from acidity; plants tolerant of acidity, such as the yellow lupin, were actually stimulated by *C. solani* to increased growth. Sprouting Ackersegen potatoes in 40 per cent. peat inoculated with a highly pathogenic strain of *C. solani* specific to potatoes were nearly as good as the non-infected controls. Even 5 to 10 per cent. sphagnum peat can confer excellent protection against *Calonectria nivalis*.

The authors conclude that, while such peat admixtures are not profitable on a field scale and small admixtures may even increase damage, they may be valuable in market gardening. Even 20 per cent. would not be uneconomical with lime to neutralize the acidity.

Thornton (H. G.). **Soil microbiology department.**—*Rep. Rothamst. exp. Sta., 1952*, pp. 58–64, 1953.

Futher investigation by F. A. Skinner of the competition between *Streptomyces albidoflavus* and *Fusarium culmorum* [*R.A.M.*, 33, p. 168] clearly showed that the actinomycete can affect the fungus by (1) direct attack on the hyphae, (2) the production of antibiotic secretions, and (3) competition for nutrients, which was more acute at high than at low nutrient levels.

Nissen (T. V.). **Effects of antibiotics on carbon dioxide production in soil.**—*Nature, Lond.*, 174, 4422, pp. 226–227, 2 graphs, 1954.

The effect of high concentrations of antibiotics on the soil microflora [*R.A.M.*, 33, p. 369] was studied in the Bacteriological Department, State Laboratory of Plant Culture, Lyngby, Denmark, by using Petersen's method (*Tidsskr. Planteavl*, 32, p. 625, 1926) to determine the evolution of carbon dioxide as a measure of the rate and extent of biological activity. Penicillin, chloromycetin [chloramphenicol], and terramycin slightly reduced the carbon dioxide output during the first 24 to 72 hours, then there was a considerable increase, giving approximately twice the amount evolved in the control experiments. The excess over the control corresponded to 10 to 20 per cent. of the carbon in the amounts of the three antibiotics added. There was a slight but persistent inhibition with aureomycin and streptomycin during the 16-day period, indicating that no decomposition of the antibiotics took place. Plate cultures made from the soils used in the penicillin, chloramphenicol, and terramycin experiments and given only these substances as the carbon source yielded in each case soil fungi which were able to grow in a liquid synthetic medium with the corresponding antibiotic as the sole carbon source. From these experiments it appears that fungi play an important part in the decomposition of antibiotics in the soil.

Coppenet (M.) & Jolivet (E.). **Détection de graves carences en cuivre dans les terres très humifères du centre de la Bretagne.** [The detection of serious copper deficiencies in soils of high humus content in central Brittany.]—*C.R. Acad. Agric. Fr.*, 38, 17, pp. 691–693, 1952.

In October, 1951, severe copper deficiency [*R.A.M.*, 31, p. 576] was found to be affecting the growth of several crops on soil rich in humus at Morbihan, Brittany, France. In spring, 1952, barley [32, p. 234] and oat plants were green at the base, but the young leaves were etiolated and white at the tips, the difference being clearly marked. In July the barley spikes emerged with difficulty and the oat spikelets were white and sterile. The condition was relieved by spraying in June with 0·2 per cent. copper sulphate, just as the symptoms were becoming apparent, and by incorporating 50 to 200 kg. copper sulphate per ha. in the soil. The diagnosis of the disorder was confirmed by chemical analysis of the crops affected. Further studies are in progress.

Löhnis (Marie P.). **Manganese toxicity in field and market garden crops.**—*Plant & Soil*, 3, 3, pp. 193–222, 6 pl. (2 col.), 2 graphs, 1951.

A full account is given of studies at the Laboratorium voor Microbiologie, Wageningen, Holland, on manganese toxicity [cf. *R.A.M.*, 26, p. 372; 32, p. 210]. Beans (*Phaseolus vulgaris*) grown in unlimed or sparsely limed soil were seriously affected by the disorder. Over a period of some years the manganese content in healthy young bean leaves in these plots ranged from 40 to 940 p.p.m., and in affected leaves from 1,104 to 4,261 p.p.m. At high air temperatures bean plants in nutrient solutions appeared to tolerate a high manganese content in the

leaves without visible injury. Vetch (*Vicia sativa*) and lucerne were highly susceptible, red clover (*Trifolium pratense*) showed slight symptoms and recovered, while white clover (*T. repens*) merely lagged in initial development, solution cultures corroborating the results of field tests. Mangolds were depressed in growth in the more acid plots, but this did not occur in field tests. Flax, potatoes [loc. cit.], tobacco, mustard, oats [33, p. 476], and strawberries were tolerant in the field. In nutrient solutions peas, broad beans, and vines appeared to be insensitive to manganese toxicity but lettuce was slightly injured in the presence of excess of manganese sulphate. Manganese tolerance appears to be due either to weak absorption or to strong tolerance within the plants. The marked sensitiveness of beans may be the result of excessive absorption, and may be useful for soil tests for excess manganese.

In the field manganese-induced symptoms on beans differ from iron-induced symptoms; in solution cultures at high temperatures manganese excess induced iron deficiency.

Blacklock (J. S.). **A short study of Pepper culture with special reference to Sarawak.**—*Trop. Agriculture, Trin.*, 31, 1, pp. 40–56, 3 figs., 1954.

In the section on diseases in this paper the author describes the fungal diseases present on pepper (*Piper nigrum*) in Sarawak and the methods of treatment found successful under local conditions. *Fomes lignosus* [*R.A.M.*, 32, p. 398] attacks the main stem and roots, causing the stem to turn a dirty grey colour and eventually to rot away to a wet sappy mass. The vine may recover if the disease is checked in the early stages by cutting 6 in. to 1 ft. below the lowest limit of infection close to a lateral branch; the cut should be treated with agrosol solution. Old support posts should be scraped and painted with 2 per cent. copper sulphate solution or replaced by new ones treated with the solution, the same treatment being given to the truncated stem and the stems of the remaining shoots.

Root rot (*Ganoderma lucidum*) causes heavy losses if not checked in time, old tree stumps serving as the main sources of infection. The roots are enclosed in a continuous rubbery skin produced by a rhizomorphic mycelium, which in the early stages is dirty white, and later becomes dark red. The root rots away to a wet sappy mass. Early detection and treatment of the disease by the removal and burning of the rotten roots and broken pieces of mycelium, and drenching the whole root system with 2 per cent. copper sulphate solution are essential.

Should serious outbreaks of *Cephaleuros parasiticus* [*C. mycoidea*: 2, p. 337] occur, the use of modern copper fungicides, such as perenox, is recommended. The incidence of sudden death, a virulent complex root disease similar to that reported to be spreading in pepper growing areas of Singapore Island and Malaya, and in Indonesia and Indochina [32, p. 509], has increased considerably in the last year. Attempts to control the disease have failed so far. Physical damage to the root system, excessive nitrogenous manuring, or manuring before or during wet weather apparently favour the onset of the disease. Leaf wilt may often indicate the presence of the disease which, however, can be found in advanced stages without this symptom. The initial wilt, which progresses from the base upwards but is sometimes confined to the top of the vine, is followed by a rapid leaf fall, the remaining leaves becoming chlorotic or blotchy and black, withering and shrinking of the fruit, and rapid die-back. A chlorotic mottling [cf. 14, p. 152] and distortion of leaves accompanying underdeveloped shoots, resulting in reduced yields, is sometimes observed and is believed to be perpetuated by vegetative propagation.

Various foliage symptoms, due to possible deficiency disorders, have been observed on peppers growing in poorer types of soils, particularly sandy ones.

Askew (H. O.) & Monk (R. J). **Boron deficiency and uptake of boron in the Hop plant.**—*N.Z.J. Sci. Tech.*, Sect. A, 35, 4, pp. 279–300, 5 figs., 4 graphs, 1953.

Extensive trials at the Cawthron Institute, Nelson, New Zealand, for improving boron deficiency in hops [*R.A.M.*, 30, p. 488; 32, p. 398] have shown that borax applied as a soil dressing (½ oz. per hill) is readily absorbed by the plants and produces a marked increase in boron content of leaves and cones, the normal values of which should be 25 to 50 and 20 to 25 p.p.m., respectively, according to the season. The removal of boron in the harvested hops corresponds to about 8 oz. of borax per acre per season, e.g. nearly half of the total boron intake by plants not treated with borax.

Stow (I.). **A new disease of Hop due to a bacterium.**—*Proc. Japan Acad.* (formerly *Proc. imp. Acad. Japan*), 30, 3, pp. 226–231, 5 figs., 1954.

Within the past few years an epidemic disease of hops has appeared in many hop gardens in Japan, with the exception of Hokkaido province. There are four types of symptom: the 'cauliflower-like type', characterized by the formation of hundreds of densely massed buds on the surface of the swollen rootstock tissue, usually appears in late April or early May. The 'witches' broom type', proceeding from the first type and usually appearing late in May, is characterized by numerous thin or abnormally shrunken shoots, already forming secondary buds or short, degenerated branches, on the rootstock crown. Witches' brooms have also been observed from late summer to mid-October, having arisen independently of the 'cauliflower type'. The 'whip-shaped type', usually confined to late May, arises when the bines are 1·5 to 2 m. long by the leaves degenerating to a parrot-bill shape and disappearing from several of the apical nodes, leaving the tips bare. The latter may wilt and result in the development of affected laterals. 'Dry tip rot' is typified by the bine tip dying off suddenly when it has nearly reached the top wire. The lateral buds of the upper nodes, however, give rise to healthy, vigorous branches. This phase occurs only in vigorous, well fertilized plants and is confined to mid-June.

A bacterium was isolated from the plugged vessels and intercellular spaces of the witches' broom and whip-shaped types and various other bacteria from witches' brooms. One strain, when inoculated in late August to the tips of 1·5 m. long healthy shoots, gave rise in two cases to dry tip rot. The disease is tentatively ascribed to a species of *Aplanobacter*, which closely resembles *A.* [*Corynebacterium*] *insidiosum*, and, to some extent, *A.* [*C.*] *fascians*.

Cairaschi (E.-A.). **Note sur la 'mosaïque chlorotique', nouvelle maladie à virus des Houblons en Alsace.** [A note on 'chlorotic mosaic', a new virus disease of Hops in Alsace.]—*Rev. Path. vég.*, 32, 3, pp. 175–180, 1 fig., 1 diag., 1953.

The author reports the presence of chlorotic virus disease of hops [cf. *R.A.M.*, 27, p. 43] during 1952 and 1953 in the area between Strasburg and Champagne. In 1953 the yields of affected plants were reduced by up to 50 per cent., and in some gardens 10 per cent. of the plants were infected. Spread appeared to occur in concentric circles. Transmission was effected by grafting. The control methods recommended comprise the removal of all affected plants and neighbouring ones, insecticidal spraying, and the use of resistant varieties or selected material obtained from healthy, regularly inspected hop gardens.

Poole (D. D.). **Disease observations on Castorbeans in 1953.**—*Plant Dis. Reptr*, 38, 3, pp. 218–220, 1954. [Multilithed.]

A brief survey is given of the diseases of castor bean (*Ricinus communis*) occurring in the United States. They are bacterial leaf spot (*Xanthomonas ricinicola*)

[*R.A.M.*, 33, p. 181], the most serious; *Alternaria* leaf spot (*A. ricini*) [29, p. 171], second in importance and to which Cimarron appears resistant in Texas; root rot (*Phymatotrichum omnivorum*) [cf. 23, p. 499], occurring in central Texas on Houston clay soil, of minor importance; southern blight (*Sclerotium rolfsii*) [cf. 17, p. 557], which though widespread causes little loss; grey mould (*Sclerotinia ricini*) [cf. 25, p. 233], of minor importance, occurring in variety observation plots at Gainesville, Florida, and Houma, Louisiana; and an unidentified virus-like disease observed in 1953 in Texas and Oklahoma, characterized by crinkling of the leaves and stunting of the plants, which later recovered. A *Cercospora* sp. was isolated from blasted racemes of several varieties at Gainesville in 1953.

Bruehl (G. W.). **Host range of chlorotic streak disease of Sugar Cane.**—*Plant Dis. Reptr*, 38, 4, pp. 264–265, 1954. [Multilithed.]

During an inspection of the sugar-cane breeding nursery at Río Piedras, Puerto Rico, in 1952–3 *Panicum maximum*, *Erianthus arundinaceus*, and *E. maximus* were found to be new hosts of sugar-cane chlorotic streak virus [*R.A.M.*, 32, p. 644].

Pérez (J. E.) & Adsuar (J.). **Serological reactivity of Sugarcane-mosaic virus.**—*J. Agric. Univ. P.R.*, 38, 1, pp. 9–15, 1 pl., 1954.

At the Agricultural Experiment Station, University of Puerto Rico, Río Piedras, infective sap from the sugar-cane variety B.H.10–12 affected by sugar-cane mosaic virus [*R.A.M.*, 29, p. 478, and next abstract] was centrifuged at high speed, and the sediment suspended in phosphate buffer and inoculated into rabbits intravenally and intraperitoneally. Specific antibodies were demonstrated when the rabbit sera were absorbed with healthy cane sap and they had titres of $\frac{1}{128}$ or $\frac{1}{256}$ when tested against mosaic-infected sap by the precipitation technique. The antisera did not react with healthy cane sap after absorption. Normal rabbit serum did not react with either the healthy or infective sap used in the tests.

Adsuar (J.). **Further studies on the mosaic of the Sugarcane variety Mayagüez 336.**—*J. Agric. Univ. P.R.*, 38, 1, pp. 16–21, 1954.

Further studies on the mosaic disease of the sugar-cane variety Mayagüez 336 in Puerto Rico [*R.A.M.*, 31, p. 256] demonstrated its transmission mechanically from M.336 to B.H.10–12 [see preceding abstract], Sta. Cruz 12–4, Co. 281, and C.P. 29–291 but not to P.O.J. 2878 or P.R. 902 which are also resistant to common sugar-cane mosaic. The symptoms produced by the 336 virus on the above hosts were indistinguishable from those of common mosaic; the physical properties of the viruses were also identical. The 336 virus was transmitted successfully by means of *Aphis maidis* from infected sorghum, B.H. 10–12, and Sta. Cruz 12–4 to Mayagüez 336. From these results it appears that the two viruses are probably identical.

Performance of varieties in contributing Colonies.—*Rep. B.W.I. Sug. Cane Breed. Sta. 1952*, pp. 31–35, [?1954. Received April, 1954.]

It is reported that in Jamaica the mosaic-resistant sugar-cane varieties B.4362, B.11227, and B.42231 [cf. *R.A.M.*, 33, p. 212] were in large-scale commercial planting in 1952 and gave promising results.

Costa (A. S.), de Aguirre (J. M.), Segalla (A. L.), & Alvarez (R.). **Resistência ao mosaico dos 'seedlings' de Cana de Açúcar obtidos em 1950.** [Resistance to mosaic of Sugar-Cane seedlings obtained in 1950.]—*Bragantia*, 12, 7–9, pp. 285–290, 1 pl., 1952. [English summary. Received June, 1954.]

At the Agronomic Institute, Campinas, São Paulo, Brazil, sugar-cane seedlings were tested for resistance to sugar-cane mosaic virus [*R.A.M.*, 33, p. 261] by inocu-

lation with sap from infected maize plants diluted 1 in 2 or 1 in 5 with 0·01 M sodium sulphite after abrasion with carborundum, which was selected as the best method after preliminary trials [31, p. 459]. Of 21,673 seedlings from various crosses, 9,512 developed infection. Varieties of the C.P. group conferred a higher degree of resistance on the hybrids than did the Co.'s.

Twenty-third Annual Report of the Sugarcane Research Station, Mauritius, 1952.—28 pp., 1953. [Received February, 1954.]

Experiments on the disinfection of sugar-cane cuttings carried out at the Experimental Stations at Réduit, Plaines Wilhelms, and Pamplemousses are reported by E. Rochecouste (pp. 22–25) [cf. *R.A.M.*, 32, p. 591]. Aretan and R1412×187 (both at 0·1 per cent.) gave similar results in the control of pineapple disease [*Ceratocystis paradoxa*: 32, p. 614], reducing the number of infected cuttings (average of three trials) from 59 to 24; they were more effective in a dry locality. Instantaneous dipping with aretan was more effective than 0·1 per cent. solusanigran, but in a five-minute dip, both at the same concentration (0·1 per cent.), the latter was more effective than the former in the promotion of shoot length, though less so in the control of *C. paradoxa*.

Subramanian (T. V.) & Prakasam (P.). **Some studies on pineapple disease of Sugarcane.**—*Proc.* [*first*] *Conf. Sug. Cane Res. Wkrs, India*, II–3, pp. 55–63, 1951. [Received 1954.]

Experimental work at the Sugar-cane Research Station, Anakapalli, [Madras], has indicated that germination failure in sugar-cane setts on the peasants' farms in the State might be attributable to pineapple disease, *Ceratostomella* [*Ceratocystis*] *paradoxa* [C.M.I. map No. 142].

Subramanian (T. V.) & Lakshmipati Rao (V.). **Infection and development of Ustilago scitaminea Syd. in Sugarcane.**—*Proc.* [*first*] *Conf. Sug. Cane Res. Wkrs, India*, II–3, pp. 55–63, 1951. [Received 1954.]

Studies at the Sugar-cane Research Station, Anakapalli, Madras, have shown that smut (*Ustilago scitaminea*) [*R.A.M.*, 32, p. 544] infection may be carried internally as mycelium in setts taken from smutted canes, even if these seemed healthy at the time of planting. The disease was also spread by spores on setts taken from healthy plants adjacent to infected ones. Healthy setts were infected by soil-borne spores, and young tender growing shoots by mechanical inoculation with spore suspensions, sori appearing within 15 days on the former and after 70 days on the latter.

Chona (B. L.) & Bajaj (B. S.). **Occurrence in nature of Physalospora tucumanensis Speg., the perfect stage of Sugarcane red rot organism, in India.**—*Indian Phytopath.*, 6 (*1953*), 1, pp. 63–65, 4 figs., 1954.

Perithecia of *Physalospora tucumanensis* were observed for the first time in nature in India on old, desiccated leaves of various 18-month-old sugar-cane varieties at New Delhi [cf. *R.A.M.*, 33, pp. 477, 562]. Single ascospores gave typical cultures of the red rot fungus. The asci, measuring 43·5 to 73·5 by 7 to 13·5 (average 62·5 by 10·8) μ and the ascospores, 16 to 23 by 5 to 7·5 (18·4 by 5·8) μ, were slightly smaller than those described earlier [23, p. 358] but fell well within the range given.

Drummond (O. A.). **Uma séria queima das folhas da Cana de Açúcar.** [A serious blight of Sugar-Cane leaves.]—*An. Congr. Soc. bot. Brasil, 1953*, pp. 67–74, 2 figs., 2 graphs, 1953. [English summary.]

In 1952 *Helminthosporium ocellum* [cf. *R.A.M.*, 13, p. 12; 20, p. 426] assumed an

epiphytotic form on the foliage of sugar-cane in the States of Rio de Janeiro and Minas Gerais, Brazil [16, p. 127]. The pathogen normally thrives in a humid, relatively cool atmosphere, but the climate in the affected areas is dry and temperate. Evidently, therefore, environment is not a limiting factor in the development of the disease, the severity of which in this instance is attributed to the cultivation of susceptible varieties, such as Co. 419, which sustained the heaviest damage, followed by Mayagüez 151 and Co. 421.

Zundel (G. L.). **The Ustilaginales of the world.**—xi+410 pp., 3 figs., The Pennsylvania State College School of Agriculture, 1953. $3.50. [Mimeographed.]

This posthumous publication (*Contr. Dep. Bot. Pennsylvania State Coll.* 176), the first to cover the Ustilaginales [*R.A.M.*, 30, p. 432] on a world basis, combines all the author's studies on the subject, some of which have been published [loc. cit.; 23, p. 501]. A brief preliminary section (pp. 1–19) includes a historical review, characterization of the group, taxonomy and cytology, selected and cited references, and keys to the genera and families. The genera are treated alphabetically under the two families and the species alphabetically also. The work concludes with a host index and an index of synonyms.

Holton (C. S.) & Siang (W. N.). **Spore germination in Tilletia asperifolia, a species unique to the genus.**—*Phytopathology*, 43, 4, pp. 219–220, 1 fig., 1953.

For taxonomic purposes all species of *Tilletia* require a description of the spore germination [cf. *R.A.M.*, 32, p. 566]. In studies at Washington Agricultural Experiment Station, Pullman, the authors found that the chlamydospore of *Tilletia asperifolia* from *Muhlenbergia asperifolia* [24, p. 206] produces a promycelium with an apical whorl of broadly cylindrical primary sporidia. Fusion occurs in pairs at or near the base, and falcate secondary sporidia arise from both single and fused primary ones in the same manner as those of *T. caries*.

Weresub (Luella K.). **Studies of Canadian Thelephoraceae X. Some species of Peniophora, section Tubuliferae.**—*Canad. J. Bot.*, 31, 6, pp. 760–778, 9 figs., 1953.

For this further contribution to this series [cf. *R.A.M.*, 32, p. 349] herbarium material of species of *Peniophora* which appear to belong to subsection *** of Bourdot and Galzin's section *Tubuliferae* were studied. The solubility of the thickened cystidial walls in 10 per cent. potassium hydroxide is taken as the key character of the group. Six previously described species and two proposed as new are described fully; also included in a provisional key are four recently described, well-defined species and three long-standing ones which require further study.

Skolko (A. J.) & Groves (J. W.). **Notes on seed-borne fungi VII. Chaetomium.**—*Canad. J. Bot.*, 31, 6, pp. 779–809, 13 pl., 1953.

In this second paper on *Chaetomium* in this series [cf. *R.A.M.*, 28, p. 197] the remaining 47 species are described and illustrated; of these, 16 were isolated from seeds, including *C. atrosporum* n.sp. from carrot. Descriptions of type collections and illustrations of some of these are included. A key to the recognized species is provided.

Barr (Margaret E.). **Pyrenomycetes of British Columbia.**—*Canad. J. Bot.*, 31, 6, pp. 810–830, 1953.

This is an annotated, systematic list of 258 species and six varieties of pyrenomycetes collected in British Columbia [*R.A.M.*, 32, p. 558], distributed in 94 genera. It was compiled from the writer's collections, from the Canadian Plant

Disease Surveys, and from herbaria of the University of British Columbia, the Science Service, Ottawa, and elsewhere. A host index is provided.

Chupp (C.). **A monograph of the fungus genus Cercospora.**—667 pp., 222 figs., Ithaca, New York, published by the author, 1954. $10.00.

This monograph contains a general discussion of *Cercospora* (pp. 9–20) and a key to genera sometimes confused with it, descriptions of species and line drawings of many (pp. 21–609), followed by an index of host genera and species and an index of the species of *Cercospora* and their synonyms.

The author considers that all species of *Cercospora* are parasites of vascular plants, though they may accompany or follow other fungi or even grow semi-saprophytically when inoculated on plants under moist bell-jars. Most of the species are considered to be strictly limited in their host range, sometimes to a single species of host.

In the text the species are grouped by host families from Acanthaceae to Zygophyllaceae. Many keys are given to the species on certain host families or genera. About 130 new species, combinations, or names are proposed. The name of each species previously described as *Cercospora* is followed by its place and date of publication, synonymy if any, a revised description, and notes; or, alternatively, by a suggested redisposition into some other genus.

During his 30 years of study of this subject the author has seen material of a large percentage of the older species and [cf. *R.A.M.*, 24, p. 388] has studied collections from many parts of the world.

It is considered that all reports of the type species, *C. apii*, on hosts other than celery, are erroneous. New species described on hosts of economic importance include *C. bertrandii* on Bloomsdale spinach in Quebec (conidia 3- to 7-septate, hyaline, 3 to 5·5 by 15 to 65 μ), *C. querci* on oak (*Quercus bicolor*) in Louisiana (conidia multiseptate, 2 to 4·5 by 40 to 250 μ), *C. secalis* on rye in Virginia (conidia multiseptate, 3 to 4·5 by 20 to 105 μ), *C. angustata* on *Cassia hirsuta* in Columbia (conidia 3- to 7-septate, 2 to 4 by 15 to 75 μ), and *Cercospora morina* on white mulberry in Minas Gerais, Brazil (conidia multiseptate, 2·5 to 5 by 60 to 225 μ). *C. deightonii* n.sp. on eggplant in Sierra Leone and Japan is separated from other *C.* spp. on the same host by having mostly obclavate conidia (3- to 9-septate, 2·5 to 5 by 25 to 90 μ) and lacking stromata. Among the new combinations are *C. eugeniae* (syn. *Cercosporina eugeniae* Rangel.) on *Eugenia javanica*, *E. monticola*, and *E. uniflora*, *Cercospora caracallae* (syn. *Cercosporina caracallae*) on beans (*Phaseolus vulgaris*, *P. mungo*, and other *P.* spp.), and *Cercospora cassiocarpa* (syn. *C. occidentalis* var. *cassiocarpa*) on *Cassia occidentalis*. Also included are *Cercospora mamaonis* nom. nov. (syn. *C. papayae* Viégas & Chupp) on papaw and *C. papavericola* nom. nov. (syn. *C. papaveri* Muller & Chupp) on opium and garden poppies.

Ramakrishnan (T. S.), Srinivasan (K. V.), & Sundaram (N. V.). **Additions to the fungi of Madras.—XIV.**—*Proc. Indian Acad. Sci.*, Sect. B, 37, 3, pp. 83–95, 17 figs., 1953.

This annotated list [cf. *R.A.M.*, 32, p. 103 and following abstracts] of 24 species includes ten new ones. *Didymosphaeria jambolana* n.sp. attacks leaves of *Syzygium jambolanum* [*Eugenia cumini*] and has erumpent orange-red to dark brown perithecia 196 to 465 by 154 to 448 μ, with cylindrical asci 170 by 19 μ, and bicellular ascospores 19 by 12 μ. *Guignardia rugosa* n.sp. attacks leaves of *Rubus rugosus*, and has globose, submerged, black perithecia, 140 to 210 μ high and 112 to 192 μ broad, with clavate asci 78 by 22 μ, and unicellular spores 16 by 8 μ. Two common rusts in the Nilgiri Hills are *Puccinia sorghi* on maize [cf. 32, p. 250] and *Uromyces fabae* causing heavy damage on broad beans [C.M.I. map No. 200] in some years.

Ramakrishnan (T. S.) & Sundaram (N. V.). **Additions to the fungi of Madras.—XV.**—*Proc. Indian Acad. Sci.*, Sect. B., 38, 5, pp. 187–194, 9 figs., 1953.

Among the 14 records in this further contribution to the mycoflora of Madras [see preceding abstract] are nine new species. Mention may be made of *Meliola stenospora*, prevalent in parts of Malabar and South Kanara on living leaves of *Strychnos nuxvomica*, *Ramularia mimosae* on *Mimosa pudica* in Coimbatore, and *Gloeosporium albo-rubrum* on rubber (*Hevea brasiliensis*) in Travancore State, as well as two new species. *Schiffnerula malabarensis* n.sp., collected in Wynaad on passion fruit (*Passiflora edulis*), forms amphigenous, thin, black colonies and a mycelium of brown hyphae forming a loose network, up to 9 μ thick; the hyphopodia are alternate or sometimes opposite, sessile, subglobose, unicellular, sometimes elongated, tapering, and bicellular, and measure 12 to 18 by 9 to 12 μ; the perithecia are globose, scattered, 78 to 170 by 69 to 150 μ; and the ascospores dark brown, ellipsoid, uniseptate, constricted at the septum, upper cell shorter than the lower, 12·6 by 5·6 (11 to 16 by 4 to 7) μ.

Puccinia curcumae n.sp. was found in Mundage (South Kanara) on a species of *Curcuma*; artificial inoculations with viable uredospores lead to successful infection on *C. longa* alone. The uredo- and teleutosori are minute, hypophyllous, and light yellow; the uredospores are subglobose to ovate, with very short stalks, echinulate, and 31 by 24 (25 to 47 by 19 to 28) μ; and the subhyaline teleutospores, with pedicels up to 12 μ long, are clavate, the apex being pointed or rounded and slightly thickened (up to 6 μ), and measure 37 by 16 (28 to 47 by 12 to 19) μ; they germinate *in situ*.

Ramakrishnan (T. S.) & Sundaram (N. V.). **Notes on some fungi from South India II.**—*Indian Phytopath.*, 6 (*1953*), 1, pp. 27–38, 2 pl., 1954.

A further contribution to this series comprises notes on 18 fungi collected in South India [cf. *R.A.M.*, 33, p. 449 and preceding abstracts], 13 of them new species. They include *Puccinia brizae-maximae* n.sp. on *Briza maxima*, which differs from *P. graminis* in having elliptical mesospores measuring 22 to 37 by 12 to 16 μ with a thickened apex and being non-pathogenic in inoculation experiments to wheat, barley, oats, and rye; and *Stilbospora celtidis* n.sp. causing brown, hypophyllous, more or less circular spots up to 0·2 mm. in diameter on leaves of *Celtis tetrandra* and characterized by light olivaceous, straight or curved conidia 19 to 44 by 2·5 to 4·5 (average 32 by 3) μ.

Arx (J. A. v.). **Ueber die Ascomycetengattungen Ceratostomella Sacc., Ophiostoma Syd. und Rostrella Zimmermann.** [On the ascomycetous genera *Ceratostomella* Sacc., *Ophiostoma* Syd., and *Rostrella* Zimmermann.]—*Leeuwenhoek ned. Tijdschr.*, 18, pp. 201–213, 3 figs., 1952. [English summary.]

If *Ceratostomella vestita* (syn. *C. cirrhosa* and many others) is regarded as the type of *Ceratostomella* then the genus might be considered a member of the Diaporthaceae (*sensu* Miller) [*R.A.M.*, 28, p. 547]. This species has perithecia with a rather thick wall consisting of several layers of slightly compressed, dark cells. The neck is long, cylindrical, and lined with periphyses. The asci are cylindrical with a refractive ring in the thickened tip. The spores are continuous and hyaline when young, with two or four oildrops, and often develop one or three pseudosepta when old. *Rostrella coffeae* [*Ceratocystis fimbriata*: 30, p. 498] is transferred as *Ophiostoma coffeae* n.comb., the name *Rostrella* being antedated by another genus of fungi of the same name. Other n.combs. transferred from *Ceratostomella* are *O. multiannulatum* [32, p. 498], *O. obscurum* [19, p. 315], *O. piceaperdum* [15, p. 544], *O. pseudotsugae* [loc. cit.], *O. montium* [23, p. 311], *O. radicicolum* [21, p. 195], *O. leptographoides* [22, p. 178], *O. microsporum* [23, p. 311], and *O. rostrocylindricum*

[22, p. 218], and from *Endoconidiophora*, *O. bunae* [16, p. 577], *O. virescens* [31, p. 41], and *O. variosporum* [24, p. 37], and from *Grosmannia*, *O. serpens* [22, p. 104].

TIFFANY (L[OIS] H.) & GILMAN (J. C.). **Species of Colletotrichum from legumes.**—*Mycologia*, 46, 1, pp. 52–75, 3 pl., 1954.

An account is given of studies at Iowa Agricultural Experiment Station, Ames, on species of *Colletotrichum* found on legumes (some of the information has been reported elsewhere [*R.A.M.*, 30, p. 598]), with special reference to their host ranges, cultural characters, and spore morphology. Those dealt with in the curved-spore group are *C. truncatum* [31, p. 267; 33, p. 233] on Lima bean (*Phaseolus lunatus*), bean (*P. vulgaris*), lucerne, red clover, soy-bean, *Vicia villosa*, and *Lotus purshianus*; *C. villosum* [32, p. 564] on *V.* spp.; and *C. graminicola* [30, p. 598] on various Gramineae, lucerne, and white clover; and in the straight-spore group *C. trifolii* [loc. cit.] on red clover and lucerne; *C. destructivum* [loc. cit.] on red clover, lucerne, soy-bean, *Vicia* spp., and *Melilotus alba*; *Glomerella glycines* [loc. cit.] on soy-bean and lucerne; *G. cingulata* [30, p. 375] on *Lupinus angustifolius* and kudzu (*Pueraria thunbergiana*); and *C. lindemuthianum* [30, p. 599] on bean.

Successful cross-inoculations with cultures of *C. truncatum* were made on soy-bean, lucerne, sweet clover [*Melilotus* spp.], Lima bean, and pea, using the Lima bean isolate. Inoculations with the soy-bean isolates caused a rapid breakdown of the tissues of lucerne, sweet clover, and red clover, and infected soy-bean, lespedeza, ladino clover, bird's-foot trefoil [*Lotus* sp.], Lima bean, and pea. The soy-bean isolate was reisolated from green plants of various species, none of which showed any disease.

C. trifolii was successfully established on red clover, lucerne, and sweet clover, the lesions produced being indistinguishable from those caused by *C. destructivum*. All the isolates of the former species examined had shorter, somewhat narrower conidia than those of the latter.

For numerous isolates of *C. destructivum* from various legumes (one from soy-bean) and *G. glycines*, the optimum temperature for mycelial growth lay between 25° and 30° C. In sterile distilled water there was little spore germination at temperatures below 10° or over 30° after 48 hours. Between 15° and 25°, 95 to 100 per cent. germination occurred in 24 hours, and at 30° approached 100 per cent. after 48 hours. Some of the isolates which produced only a sclerotial type of growth on artificial media, such as the soy-bean and pea isolates of *C. destructivum*, produced exactly the same kind of acervuli and conidia as did other isolates of the same species when cultured on sterilized stems.

C. destructivum appeared to be quite omnivorous. The individual isolates from lucerne, red clover, and sweet clover were as pathogenic to all the host species on which they were tested as they were to the original host. Some lucerne and sweet clover stems failed to develop lesions or other disease symptoms, though the fungus could be readily isolated, and the stems assumed a 'shepherd's crook' appearance. As the plants became older, symptomless diseased stems and their side branches died without developing a definite lesion, but acervuli were then produced over the whole area. The same result was not obtained when these two hosts were successfully inoculated with other *C.* species. The sclerotial soy-bean isolate of *C. destructivum* was not aggressive, and appeared to be unable actively to parasitize vigorous, rapidly growing plants.

Lucerne and sweet clover plants that had been inoculated with *C. destructivum* and overwintered out of doors in bags produced in January perithecia and ascospores identical with those of *G. glycines*. They were accompanied by acervuli of *C. destructivum*. Single ascospore and conidial isolates produced identical cultures typical of *G. glycines*. Isolates of *G. glycines* (soy-bean strain) from a given ascus and those from any one perithecium had the same cultural characters. The isolates

from one particular perithecium differed from those of the others in not forming the vegetative growth with abundant perithecia previously described as typical of *G. glycines*; instead, they gave rise to a sub-surface mat of dark green vegetative mycelium. These did not react with normal-type ascospore cultures to form perithecia.

When apples were inoculated with the lespedeza isolate of *G. cingulata* and kept in a moist chamber, no fruit rot developed; the kudzu isolate, however, and a strain from apple both caused bitter rot.

In the area covered by this investigation the anthracnoses of clover and Lima bean have been present for many years. When the soy-bean was introduced into areas where these hosts and lucerne were well established, *C. truncatum* and *C. destructivum* were both able to maintain themselves on the new host and cause diseases of economic importance.

Batista (A. C.). **Alguns representantes da flora fungica em Pernambuco.** [Some representatives of the fungus flora of Pernambuco.]—*An. Congr. Soc. bot. Brasil, 1953*, pp. 75–83, 5 figs., 1953.

Nine of the ten species of fungi in this list of recent collections from Pernambuco are new to science, including two associated foliar pathogens of guava. *Placosphaeria guajavae* n.sp. produces hypophyllous, unilocular stromata with a dark chestnut-coloured exterior and hyaline interior, the locule measuring 75 to 112 μ in diameter, with an ostiole 10 to 15 μ in diameter. The cylindrical, elongated, or elliptical, unicellular conidia measure 13 to 25 by 6 to 8 μ. Conidiophores were not observed.

Zythia psidii n.sp. is characterized by globose, ferruginous, amphigenous pycnidia, 100 to 140 μ in diameter, with an ostiole 12·5 to 20 μ in diameter, simple conidiophores up to 10 μ in length, and ovoid, pyriform, or ellipsoid, continuous, hyaline pycnidia, 8 to 13 by 5 to 6 μ.

Batista (A. C.), Vital (A. F.), da Silva (J. N.), & Gayão (Teresa de J.). **Novos ou interessantes fungos da família Meliolaceae.** [New or interesting fungi of the family Meliolaceae.]—*An. Congr. Soc. bot. Brasil, 1953*, pp. 88–114, 18 figs., 1953.

Of the 24 species of Meliolaceae [*R.A.M.*, 31, p. 33] in this list from Pernambuco, Brazil, 11 are new, namely, one each of *Balladynastrum* and *Dimeriellopsis*, three of *Irenina*, and six of *Meliola*.

Batista (A. C.), Vital (A. F.), & Gayão (T[eresa] de J.). **Alguns Leptostromataceae e outros fungos assinalados em Pernambuco.** [Some Leptostromataceae and other fungi recorded in Pernambuco.]—*An. Congr. Soc. bot. Brasil, 1953*, pp. 134–142, 3 figs., 1953.

Ten new species of foliicolous fungi are reported from Pernambuco, Brazil, including *Elachopeltis cinnamomae* and *Melophia cinnamomae* on cinnamon (*Cinnamomum zeylanicum*), *Septoria ceibae* on *Ceiba pentandra*, *Sphaerognomonia mangiferae* on mango, and *S. sizygii* on *Syzygium jambolanum* [*Eugenia cumini*].

Batista (A. C.) & Gayão (Teresa de J.). **Algunas fungos da família Hemisphaeriaceae.** [Some fungi of the family Hemisphaeriaceae.]—*An. Congr. Soc. bot. Brasil, 1953*, pp. 114–134, 13 figs., 1953.

Of the 21 species of Hemisphaeriaceae in this list of recent Brazilian collections, 20 are new, including *Micropeltis theobromae* n.sp. on living cacao leaves in Bahia.

Batista (A. C.). **Novos fungos agentes de antracnose.** [New fungal agents of anthracnose.]—*An. Congr. Soc. bot. Brasil, 1953*, pp. 142–144, 1953.

Gloeosporium anonae n.sp., the agent of large, light brown lesions on both leaf

surfaces of *Anona marckgravii* in Pernambuco, Brazil, is characterized by filiform, hyaline conidiophores, up to 12·5 μ in length, and cylindrico-fusoid, unicellular, hyaline conidia, 5 to 7·5 by 2 to 2·5 μ.

Colletotrichum averroae n.sp. produces on the leaves of *Averrhoa carambola*, also in Pernambuco, ellipsoid, whitish, black-edged lesions, 0·15 to 0·7 cm. in diameter. It may be recognized by its fuscous to black, septate setae, 30 to 67·5 by 4 to 5 μ, completely covering the acervuli, and cylindrical, hyaline conidia, 9 to 12·5 by 4 to 5 μ.

Batista (A. C.) & Gayão (T[eresa] de J.). **Uns poucos novos fungos da família Microthyriaceae.** [A few new fungi of the family Microthyriaceae.]—*An. Congr. Soc. bot. Brasil, 1953*, pp. 151–160, 5 figs., 1953.

Eight new species of Microthyriaceae [*R.A.M.*, 31, p. 33] are described from Pernambuco, Brazil, belonging to the genera *Calothyriopeltis*, *Echidnodes*, *Morenoina*, *Myiocopron*, *Phragmothyrium*, and *Pycnopeltis*.

Plant pathological department.—*Rep. Tocklai Exp. Sta., 1952*, pp. 28–63, 1953.

In this report [cf. *R.A.M.*, 32, p. 216] the results are given of six different winter treatments applied after pruning and before bud-break to young tea on the Rungajan Tea Estate, known to be severely affected by *Cephaleuros parasiticus* [*C. mycoidea*: 27, p. 260]. Although none of the treatments was of great value 0·5 per cent. perenox plus 5 per cent. ovicide and perenox plus 1 per cent. ovicide in April delayed the development of fructifications.

Outbreaks of blister blight [*Exobasidium vexans*] were reported from 18 estates in Assam, six in Cachar, seven in the Dooars, two in Sylhet, and one in Terai. Six were severe but were promptly controlled.

A spraying experiment with nine copper fungicides at 0·25 and 0·5 per cent. was begun during March on the Hattichungi Tea Estate for the control of black rot [*Corticium invisum*: 32, p. 216]. Spraying continued until the end of May and disease estimates were made from June to September. In general the 0·25 concentration and treatments applied from mid-April to the end of May were the most effective. The rot percentages for bushes receiving 0·25 per cent. perenox, copper sandoz, blitox, ialine copper, coppesan, B.S. fungicide, and wetcol were 12, 18·6, 17, 19, 18, 14, and 17 as against 34 per cent. for the unsprayed. There was some indication that high volume spraying gave a slightly greater reduction than low volume.

Nectria ochroleuca and a *Nectria* [cf. 27, p. 260] with red perithecia are prevalent in the experimental area at Tippuk. The former is probably the saprophytic species already known at Tocklai; the latter is believed to be parasitic.

A disease of the young leaves and green, succulent tea stems caused by *Botrytis* sp. was observed in a local garden. The fungus first attacked the flowers of *Crotalaria anagyroides* shade trees and then the tea beneath. Inoculation experiments demonstrated that the fungus is capable of infecting tea very rapidly in damp, shady conditions.

Laboratory tests demonstrated the efficiency of tillex [31, p. 578] at 300 gm. per 100 kg. seed in protecting seeds of *C. anagyroides* and *Tephrosia candida* inoculated with *Fusarium* [cf. 32, p. 188] spores for about nine weeks in storage. After three months the germination of treated *Crotalaria* seeds was more than double that of untreated ones.

Watanabe (I.) & Kawade (Y.). **Purification and characterization of Tobacco mosaic virus.**—*Bull. chem. Soc. Japan*, 26, 6, pp. 294–298, 3 figs., 1 diag., 1953.

At the Institute of Science and Technology, Tokyo University, tobacco mosaic virus was purified by differential centrifugation in a vacuum-type, air-driven

ultracentrifuge. The yield was high, amounting to about 2 mg. per ml. of the original plant sap.

The results of chemical analyses and the various physico-chemical operations performed on the purified preparations demonstrated a high degree of purity. The sedimentation and electrophoresis patterns also revealed an important measure of homogeneity in one of the preparations, TMV-9. Determined by the sedimentation and viscosity, sedimentation and diffusion, diffusion and viscosity, and electron microscope and X-ray diffraction methods, the particle dimensions (in mμ) were 310 by 13, 360 by 13, 360 by 15, and 300 by 15·2, respectively [cf. *R.A.M.*, 32, p. 346 *et passim*].

CHIBA (Y.), INADA (A.), & YOSHIHARA (I.). **Physiological studies on plant virus I. The effects of various inhibitors upon the lesion formation in detached leaves.**—*Enzymologia*, 16, 3, pp. 143–149, 1 pl., 1 graph, 1953.

In experiments at the Biological Institute, Kyushu University, Fukuoka, Japan [cf. *R.A.M.*, 32, p. 516], the number of lesions produced by tobacco mosaic virus in detached leaves of *Nicotiana glutinosa* was independent of the virus concentrations within a dilution range of 10^{-2} to 10^{-4} of the inoculum. No significant difference was observed in the number of lesions developing in two tests, one in darkness and the other under illumination at 1,500 lux. Lesion formation in inoculated detached leaves was inhibited by cyanide, hydroxylamine, and iodoacetate, and stimulated by sodium azide in the light. In darkness, however, the inhibitors exerted no appreciable effect on lesion development, except for stimulation by iodoacetate.

JENKINS (W. A.), SHARP (D. G.), & WOLF (F. A.). **A strain of Tobacco mosaic virus inducing systemic necrosis in flue-cured Tobacco.**—*J. Elisha Mitchell Sci. Soc.*, 69, 2, pp. 161–169, 2 figs., 1953.

A virus, believed to be a strain of tobacco mosaic virus, caused serious damage to flue-cured tobacco in the vicinity of Chatham, Virginia, in 1951 and 1952. The disease, which was first observed and was most severe on the variety Virginia Gold, is characterized by necrotic lesions in the leaf lamina, blackening and killing of sucker growth and terminal buds, necrosis of the midribs and veins, extending progressively through the cambium tissues of the petiole, stem, and roots, necrosis of the pith in the case of systemic infection, and a strikingly early maturity of plants, systemically infected ones exhibiting extreme, premature ripening of leaves.

The virus was pathogenic to several varieties of tobacco, including Turkish and dark-fired types, the leaf mottling, local lesions, and mild necrosis symptoms varying with the genetic composition of the variety tested. It is suggested that the disease may be the same as that described by Stover [*R.A.M.*, 31, p. 462], the Rotterdam-B disease [8, p. 73], and *Plantago* viroses [21, p. 227; 22, p. 328]. The use of tobacco varieties carrying the *glutinosa* factor for resistance to tobacco mosaic virus and the sanitation practices used for the control of common tobacco mosaic virus may give satisfactory control.

ANDERSON (P. J.). **Combating blue mold of Tobacco.**—*Circ. Conn. agric. Exp. Sta.* 181, 12 pp., 5 figs., 1952.

This circular is designed primarily to give an outline of a possible preventive programme against tobacco blue mould (*Peronospora tabacina*) [see below, p. 642] in shade fields, based on research in Connecticut to date. Brief descriptions are given of the field and seed-bed symptoms, the life cycle of the organism [loc. cit.], and the seed-bed spray programme, for which ferbam and zineb dusts or sprays are recommended. The diluents and types of equipment to use are described.

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